JOURNAL

OF THE

Royal United Service Institution

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL.

Editor - Captain H. GARBETT, R.N. (Retired).

Vol. XL.—JUNE, 1896.—No. 220.

PAGE

No. I.—Photograph of the French first-class Battle-ship "HOCHE," the new Flag-ship of the French Channel Squadron.

,, II.—METEOROLOGY: A Factor in Naval Warfare. Lecture by Lieutenant M. W. CAMPBELL HEPWORTH, R.N.R., F.R.Met.Soc. ... 669

,, III.—THE NECESSITY FOR AN ARMY AS WELL AS A NAVY FOR THE MAINTENANCE OF THE EMPIRE. Lecture by Captain W. H. JAMES, late R.E. ... 691

,, IV.—ABYSSINIA: A Brief Sketch of its Geography and History, with map. By V. Fedoroff ... 719

,, V.—THE FRENCH 120 mm. FIELD HOWITZER, with plates. By Major F. HOLZNER ... 735

,, VI.—SHORT NOTES ON WAR BALLOONS. By Captain H. C. Prichard, 2nd Batt. Northamptonshire Regiment 753

,, VII.—Naval Notes ... 757

,, VIII.—Military Notes ... 767

,, IX.—Naval and Military Calendar for May ... 774

,, X.—Contents of Foreign Journals for May ... 776

,, XI.—Notices of Books ... 780

LONDON.

J. J. KELIHER & CO., 17B, GREAT GEORGE STREET *(Corner of Parliament Street)*, S.W., AND 33, KING WILLIAM STREET, E.C.

HODGES, FIGGIS & CO., 104, GRAFTON STREET, DUBLIN.

JOHN MENZIES & CO., EDINBURGH.

Entered at Stationers' Hall.] **Price Two Shillings.** [*All rights reserved.*

FOR SHOT GUNS

(ORDINARY CASES)

• • • USE • • •

SMOKELESS SS POWDER

HIGH VELOCITIES.
LOW PRESSURES.
LONG RANGE.

Extra Hardened. Double Waterproof. Reliable. Safe. No Jar. Hard Hitting.

QUICK AND STRONG, WITH PERFECT COMBUSTION.

The Favourite Powder.
The Choice of Experts.
The Powder of 1896.

UNEQUALLED RECORDS.

TRIALS BY ELEY BROS. & "ROD & GUN."

Velocities —At 21½ yards, 1012·68 ft. per second.
„ 43 „ 872·72 „ „

Far in excess of any other Powder, Nitro or Black.

Pattern 233.

Pads Penetrated (Eley's Special) 30·6.

Pressures 2·17 Tons only.

All future issues made to this standard.
Full report of trials sent on application.

THE SMOKELESS SCORE BOOK for (SS) GAME REGISTER and TRAP SHOOTING.

(NEW AND ENLARGED EDITION)

Is now Ready, and will be sent Free by Post on Application.

FOR SHOT GUNS

(CONE-BASE CASES) use

"SHOT-GUN RIFLEITE."

The New Condensed SMOKELESS POWDER for Cone-Base Cases. Charge for 12-bore cartridges, 37 Grains or 2 drams.

Results far ahead of all previous records. Absolutely Smokeless. Excellent Patterns. Unequalled velocities. Unaffected by damp, cold, or heat.

No Nitro Glycerine. No corrosion of barrels; entirely consumed in the barrel. No residue. No objectionable or deleterious gases. No unpleasant "Jar." No Gun Headache.

FOR RIFLES & REVOLVERS

SMOKELESS "RIFLEITE" POWDER IS THE BEST.

It is made in six distinct varieties, each thoroughly adapted for the special work for which it is intended.

"RIFLEITE ·303."
For Sporting and Military Magazine Rifles, ·236 to ·315 calibre; and for Machine Guns of same bore.

"RIFLEITE ·450."
For Martini-Henry and for Sporting Express and Military Rifles, ·360 to ·577 bore; and for Machine Guns of same calibre.

"RIFLEITE ·22."
For Rim Fire Cartridges, ·22 short and long; also for Morris Tubes.

"RIFLEITE ·250."
For Rook and Rabbit Rifles, ·230 to ·380 bore.

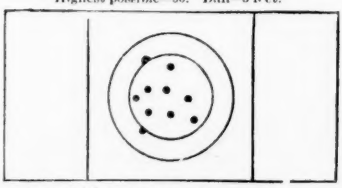
"REVOLVER RIFLEITE."
For Revolvers, British Government pattern, ·450, ·455, etc.

"BLANK RIFLEITE."
For Blank Cartridges.

"RIFLEITE ·303." BISLEY, 1895.

TOP SCORE AND TOP AVERAGE.

Diagram of Target made by W. G. Hay, 2nd V.B. Liverpool. Distance—900 yards. 10 shots. Highest possible—50. Bull—3 feet.



5 5 5 5 4 5 5 5 4 5—48 out of a possible 50.

The ammunition which made the above excellent score was loaded with 38 grains weight of "*Rifleite* ·303," with Service Bullet of 215 grains, complying with Government specification in weight of bullet and muzzle velocity.

The 48 of Private Hay was the top score in all the 900 yards ·303 M.B.L. competitions. He shot with a Government Pattern Lee-Metford with ordinary military sights, without spirit level.

RETAIL in CANISTERS or CARTRIDGES from all GUNMAKERS and AMMUNITION DEALERS and WHOLESALE from the SOLE MANUFACTURERS:—

THE SMOKELESS POWDER COMPANY, Ltd.,

Dashwood House, New Broad St., LONDON, E.C.

Works:—BARWICK, HERTS.

Telegraphic Address—
"RUSSATUS, LONDON."

CONTENTS FOR JUNE, 1896.

FRONTISPIECE— PAGE

THE FIRST-CLASS BATTLE-SHIP "HOCHE," THE NEW FLAG-SHIP OF THE FRENCH CHANNEL SQUADRON.

METEOROLOGY: A FACTOR IN NAVAL WARFARE. LECTURE BY LIEUTENANT M. W. CAMPBELL HEPWORTH, R.N.R., F.R.MET.SOC.... 669

THE NECESSITY FOR AN ARMY AS WELL AS A NAVY FOR THE MAINTENANCE OF THE EMPIRE. LECTURE BY CAPTAIN W. H. JAMES, LATE R.E. ... 691

ABYSSINIA: A BRIEF SKETCH OF ITS GEOGRAPHY AND HISTORY, WITH MAP. TRANSLATED FROM THE RUSSIAN OF V. FEDOROFF BY LIEUT.-COLONEL W. E. GOWAN (RETIRED, LATE BENGAL INFANTRY) ... 719

THE FRENCH 120-mm. FIELD HOWITZER, WITH PLATES. BY MAJOR F. HOLZNER. TRANSLATED BY PERMISSION FOR THE JOURNAL OF THE INSTITUTION FROM THE "MITTHEILUNGEN ÜBER GEGENSTÄNDE DES ARTILLERIE- UND GENIE-WESENS," BY MR. F. H. A. BEX ... 735

SHORT NOTES ON WAR BALLOONS. BY CAPTAIN H. C. PRICHARD, 2ND BATTALION NORTHAMPTONSHIRE REGIMENT 753

NAVAL NOTES 757
MILITARY NOTES 767
NAVAL AND MILITARY CALENDAR FOR MAY 774
CONTENTS OF FOREIGN JOURNALS FOR MAY 776
NOTICES OF BOOKS 780

HER MAJESTY'S TABLE WATER.
FREE FROM ORGANIC MATTER.
Sole Importers, The GODES-BERGER CO., St. Dunstan's Hill, London.

NON-POISONOUS. **IZAL** NON-POISONOUS.

DISINFECTANT.

A Luxury in the **BATH** and **HOUSEHOLD.**

IZAL HOUSEHOLD, BAR and SOFT SOAPS.

IZAL TOILET SOAP is unrivalled for the BATH, SHAVING, and CHILDREN'S USE.

IZAL TOILET PREPARATIONS, write for List, &c.

ALL our SOAPS are INVALUABLE for use with HARD WATER.

SOLE MANUFACTURERS—

NEWTON, CHAMBERS & CO., Ltd., Thorncliffe, near Sheffield.

BOVRIL

The vital principle of Prime Ox Beef is infinitely more nutritious than ordinary Meat Extract or home-made Beef Tea, being universally acknowledged as the most perfect form of concentrated nourishment at present known.

To the healthy it gives renewed vigor and increased vitality, whilst invalids relish and retain it when ordinary food is rejected. Bovril on toast or bread and butter forms a strengthening breakfast relish, or a sustaining savoury sandwich, and the perfection of appetising nourishing cookery in the preparation of Soups, Gravies, and all made dishes is economically achieved by the use of **BOVRIL**

ACCURACY OF SHOOTING IS MOST NECESSARY.

PRACTICE MAKES PERFECT.

MORRIS PATENT PRACTICE TUBES,

AIMING RIFLES AND MINIATURE AMMUNITION.

(ELECTRIC AND PERCUSSION.)

INVENTIONS FOR TEACHING PROFICIENCY

in the use of Arms of Precision at

A LARGELY REDUCED COST TO THE NATION.

ADOPTED BY HER MAJESTY'S GOVERNMENT

and extensively used in the

TRAINING OF THE NAVAL AND MILITARY FORCES OF THE EMPIRE.

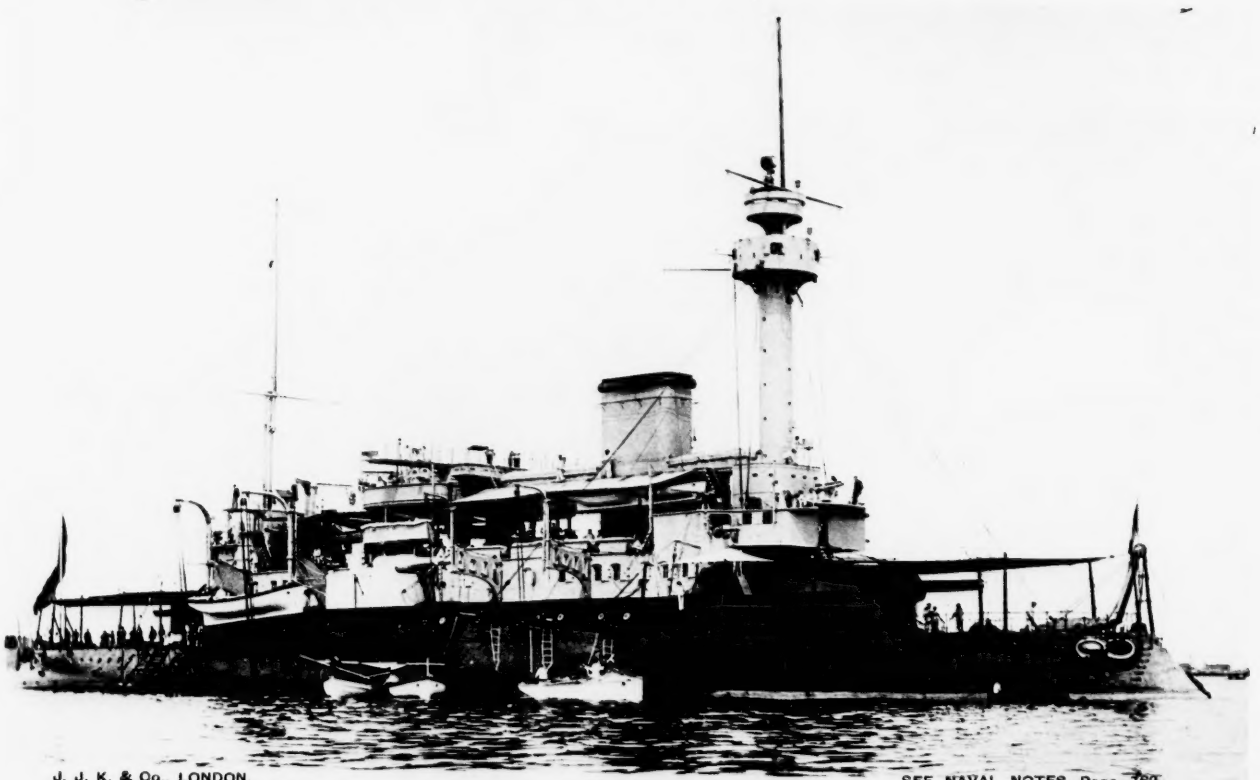
Full Particulars of PRACTICE TUBES, AMMUNITION, TARGETS, RANGES, and all ACCESSORIES may be had of—

THE INVENTORS AND PATENTEES,

THE MORRIS TUBE, AMMUNITION, & SAFETY RANGE CO., Limited,

11, Haymarket, London, S.W.,

WHERE THESE VALUABLE CONTRIVANCES MAY BE INSPECTED.



J. J. K. & Co., LONDON.

SEE NAVAL NOTES, Page 762.

The first-class Battle-ship "HOCHE," 10,650 tons, 11,300-I.H.P.

The new Flag-ship of the French Channel Squadron.

THE JOURNAL
OF THE
ROYAL UNITED SERVICE INSTITUTION.

VOL. XL. JUNE, 1896. No. 220.

[*Authors alone are responsible for the contents of their respective Papers.*]

METEOROLOGY: A FACTOR IN NAVAL WARFARE.

By Lieut. M. W. CAMPBELL HEPWORTH, R.N.R., F.R.Met.Soc.

Friday, February 14th, 1896.

Vice-Admiral P. H. COLOMB, in the Chair.

IT is to be regretted that the subject of this paper has not been brought before you by an abler exponent than myself. There are many, I feel sure, who will realise its importance, and if the following remarks have but the effect of drawing the attention of naval officers to the matter, and of obtaining for it their interest, as well as the benefit of their special knowledge, training, and intelligence, I shall feel that no apology is needed for my having introduced it.

In bringing the subject forward I am yielding to a temptation to place before the members of this Institution some ideas—crude though they may be—that have, for years, been present in my mind, with the object of inviting discussion amongst those who are best able to judge of their truth and importance. It is with considerable diffidence that I do so, wishing it to be understood that it is as a seaman to seamen that I venture to address you: bringing before you what must be considered as merely a sketch.

Given two opposing fleets of equal strength, whose *personnel* shall consist of officers and men of equal relative efficiency and experience as regards gunnery and seamanship, of equal disciplinary excellence, gallantry and *esprit de corps*, manœuvred by two opponent evolutionists of equal skill, the victory in a series of engagements shall be to the fleet in the direction of whose movements meteorology shall have given the greatest aid; and, that, on the same terms the argument applies to any opposing groups of ships as well as singly opposing vessels. And by meteorology I must be understood to mean the science which treats not only of the atmosphere and its phenomena, but also of the waters under it as mainly owing their movements to its control. This in substance is my thesis.

In other words, in the naval wars of the future the successful operator will possess amongst his many qualifications a deeper knowledge than now generally obtains of the direction and velocity of ocean streams; of the height, direction and value of ocean tides; of the changes in the direction of the winds and its complicated resultant effects upon the weather; of the current and the tides in wind systems, which vary in their peculiarities of form and rate of translation, according to the characteristics of those areas in which they originate and across which they travel; of the various types of weather in various seasons, the conditions by which they are influenced, their salient features and the signs which mark the advent of a change, together with the nature of the change to be expected. And this not only in the offing and along the shores of his native land, but in the great trade routes and along the coast-lines of many near and distant countries.

I do not, as yet, expect to find many seamen in agreement with this statement. Since steam has in general been substituted for sail as the propelling power of vessels, it has been the fashion to talk of seamanship as moribund, and to infer that the conditions, which made some knowledge of air and ocean currents a necessity to the successful commander in the past, have now ceased, or almost ceased, to exist. The old seamanship is almost dead, and, as one who spent the earlier portion of his life at sea under canvas, and first learned to look upon the successful pursuit of his business as depending upon sail and spars, I cannot but regret the fact; but the need for meteorological knowledge in these days of costly hulls, machinery, and armaments, of high speed and breathless urgency, not only remains but has become the more pressing; and has, moreover, given birth to a newer seamanship. At the conclusion of an able lecture by Commander W. F. Caborne, R.N.R., upon the Royal Naval Reserve, delivered in this theatre on the 10th of May last, the chairman, Sir George Baden Powell, it may be remembered, pointed out — and his premise should be generally accepted—that on a man-of-war there are four different functions, viz., fighting the ship, handling the ship, navigating the ship, and driving the ship.

More than a superficial knowledge of meteorology is desirable, I contend, for the able performance of any one of these four functions.

In fighting a ship successfully, she should be handled successfully; to handle a ship with skill and with that confidence, which is the result of absolute certitude that under various conditions of the elements certain alterations in the movements of screw and helm will produce certain results, a familiarity with the movements of air, sea, and stream is essential.

During a too short service in the Royal Navy some opportunities were afforded me in two of Her Majesty's battle-ships of comparing the behaviour of vessels of their class under weigh with that of large vessels of the mercantile marine in which I have served, and more particularly with one in the handling of which a similarity would be expected in that she was a twin-screw steamer; and I venture to think that what in these remarks applies to the handling of merchant steamers generally, applies

also in a large degree to war-vessels of various classes; but it is doubtful whether any of the large twin-screw liners have so much tactical mobility as the battle-ships of the present day possess, by reason of their build, and their great beam in comparison with their length. It should be understood that my conclusions are based mainly upon experience derived in the handling of vessels of the mercantile marine.

The effect of sternway upon single-screw steam vessels during light winds, and in still water undisturbed by surface streams, is, as we all know, to deflect the vessel's stern to right or left, according as the action of her propeller is right or left handed. But when moving the engines of a vessel astern, whether she be a single or twin screw steamer in a seaway or tideway, and during fresh winds, this effect is either increased, modified, overcome, or reversed, according to the relative direction and strength of the resisting element, or elements, and in relation to their combined forces; the hull of the vessel seeking the position of least resistance, and, it may be added, that the greater a vessel's length as compared with her beam, the more sensible will she be to the effect produced by these resisting elements. A single right-handed screw steamship having sternway from the action of her engines will cant, her head turning to starboard in smooth water uninfluenced by stream, when the breeze is light; but should a fresh breeze be blowing, or a strong current running against, say, her starboard beam or quarter, this effect will be vitiated, and the tendency to cant to starboard, according to the strength of the current, be overcome; and should the wind or stream be sufficiently strong the cant induced will be the other way, her head turning to port. On the other hand, should the action of the wind or current be against her port beam or quarter, it will, in harmonious action with that of the screw, greatly accelerate the turn of the vessel's head to starboard. These facts are, of course, well known, and a perception of them enables the seaman to make use of his knowledge while navigating in narrow waters, crowded rivers, roadsteads, and harbours, and to have confidence in himself in moments of emergency.

It enables him, for one thing, to turn what was once considered an imperfection in the screw into a distinct point in its favour; when he has learned in what way to make use of it, and to make full use of it, the knowledge I have mentioned of air circulation, tidal streams, and ocean currents is essential. I do not mean to infer that the experts, who in the various channels, rivers, and harbours of the world, aided by local knowledge and taught by long experience, handle, under the most adverse conditions of wind, tide and weather, vessels of all sizes and descriptions with almost unerring judgment, consciously make minute calculations as to the combined effects of wind, wave, and stream; but familiarity with every phase of weather, every combination in and over the waters they are accustomed to navigate, in time evolves, as it were, another sense, enabling them instinctively to grasp the special conditions of the moment, and to apply the measures necessary to meet any particular difficulty. Nor do I mean to infer that any seaman can hope to attain the efficiency of a pilot in every part of the globe in which he

may be required to serve, but my contention is that by a close study of the laws which govern the motions of the atmosphere, seas, and oceans generally, and the modifications and special characteristics of those regions in which he is serving, or is about to serve in particular, he may, by the application of such knowledge to as much general experience as his sea service will enable him to obtain, acquire a very valuable substitute, and one that will, in the time of need, give him a distinct superiority over those who have neglected to make a study of the subject. And such study is the more necessary according as the opportunities for obtaining practical experience are the more limited.[1]

As time goes by, and a clearer insight has been gained, generally, of the conditions and movements of the elements in which a vessel's history is made, so will the terms good and ill luck become less frequent in the vocabulary of the experienced seaman.

The turning circle of all vessels is sensibly affected, as a rule, by wind, sea, and stream. To give an instance: a steam vessel's turn to port when circling under control of her starboard helm having the wind, sea or stream on her port beam is retarded under one or more of these influences in the first quadrant of the circle, in consequence of the resistance offered by pressure against her port bow. It is accelerated in the second quadrant by having the same influence, or influences, acting in unison with her helm by pressing against her starboard bow. It is then again retarded by pressure against her starboard quarter in the third quadrant, and also by pressure against her port bow in the fourth quadrant. As an exact an estimate as possible of the room required in which to turn is not infrequently necessary, a knowledge of the conditions under which the turn is to be effected must therefore be advantageous. The degree to which the vessel's turn is effected will of course depend upon the speed at which she is travelling, and also upon the strength of the wind, sea or stream. That it is the stern of a vessel which yields to the influence of the rudder is undoubted, but it is probable that the point on which she pivots depends upon the amount of resistance offered to her bow. The value of a vessel regarded as a gun-platform depends greatly upon her stability in a seaway.

According as the undulations of the sea surface coincide more or less with the vessel's period of oscillation, so is her degree of rolling, with the change in the conditions of the sea's surface, relatively increased or reduced. Now, a change in the direction or strength of tidal streams or currents will, as I have frequently observed, in many places, as for instance

[1] In his "Influence of Sea Power upon History" Mahan tells how, at the battle of Beachy Head, the Allies, being closely pressed by the French in the van and centre of their divided line, the van placed between two fires and the centre also exposed to be doubled on, the wind luckily fell calm, "and while Tourville himself and other French ships got out their boats to tow into action again," the Allies, taking advantage of their local knowledge, anchored with all sails set, while the French ships were carried out of action by the South-West set of the ebb tide. Local knowledge will have none the less value in the present day, although the propelling power of ships is changed.

off the coast of South Africa, in the Formosa Channel, and Gulf Stream and elsewhere, effect a corresponding change in the state of the sea, and therefore in a vessel's behaviour. Near the coast especially, the strength of a stream, and often its direction, undergoes great change at comparatively short distances; and such changes occurring at no great distance are occasionally very marked, as I have noticed, in the main body of some streams. In the L'Agulhas current, for instance, between the St. John's River and the Great Fish River; off Port Phillip Heads during strong winds from seaward at flood and ebb during the strength of the tide; off Bermuda during a South-West gale and in different parts of the Formosa Channel at different seasons of the year. Those who are acquainted with the navigation of South African waters are able to tell during heavy gales from seaward when they are in the vicinity of St. John's River, although the land be obscured, by the steepness of the sea; it is where the L'Agulhas current runs strongest. If when at anchor in East London or Natal Roads, a vessel is found to roll very heavily an improvement in her behaviour may be found by shifting her anchorage nearer the shore or further seaward. Waiting outside Port Phillip Heads for slack water during a South-East gale, a steamer under my command rolled so heavily that a portion of her cargo shifted and some of the lanyards of the funnel shrouds parted, but by steaming away from the land about a mile she lay comparatively quiet. When off the pitch of the Cape of Good Hope, people have several times asked me the reason for the steamer having suddenly commenced to roll; she had previously been crossing the L'Agulhas Bank, and had then emerged into the main body of the L'Agulhas Stream.

Science does her utmost to produce the most destructive weapons mind can conceive and mechanical excellence manufacture, aptitude and training supply the greatest skill in making their use effective, and with astonishing results. But has the utmost been done to gain by every means that lies in man's power as much knowledge of, and mastery over, the elements in which these modern weapons of precision shall be used as is possible to the intelligence and skill of the races that can invent and manufacture them? In the economy of fuel, a most important factor in future naval operations, especially with ships of small coal endurance, the aid derived from a previous study of ocean meteorology will be considerable; for although it is probable that at the commencement of a great naval war the question of coal consumption will not be considered by the belligerents, but a dash at full speed made whenever ships or fleets are moved, yet, should the period of hostilities be prolonged, it would be found that the fighting power of ships and fleets is in some degree commensurable with their staying powers.

To take the utmost advantage of fair winds and favourable currents consistent with a satisfactory mileage between point and point, to exercise judgment in avoiding adverse currents and unpropitious winds as much as a due appreciation for direct routes will allow; to be able by a timely forecast of the weather to make the most of time and fuel, before a change of wind and weather takes place, and to avoid wasting

fuel when confronted by changes that would of necessity delay the commencement of the operations in view—these are some of the uses to which the meteorologist would apply his knowledge. Operations against some positions on the shores of Europe which are washed by the Atlantic Ocean could not be commenced during the passage of a low-level cyclone across the spot or its neighbourhood.

A squadron despatched from our shores flogging to the Southward against a Southerly or South-Westerly gale, in front of such an Eastward or North-Eastward moving wind system would be burning fuel for no purpose, for high seas and rough weather might be looked for where, with the wind at some point between West and North, the steep gradients in rear of the disturbance were passing away. And such waste of fuel might endanger the success of the expedition.

The same reasoning applies to war-ships despatched to relieve other war-ships enforcing a blockade.

On December 2nd, 1882, under the influence of a cyclone, whose centre was situated over Iceland, a whole gale was blowing in St. George's Channel, and a strong breeze in the English Channel from South. The next day a fresh gale from South-West extended right across the Bay of Biscay, the centre of disturbance having moved slightly to the South-Eastward, its advance having been checked by the higher pressures to the Eastward and North-Eastward; and a depression had made its appearance to the Southward of Nova Scotia. On the 4th the wind, which had shifted to the West-North-West, blew a whole gale, which prevailed from Land's-End to Vigo. The depression or second cyclone as I shall now term it, having travelled to the North-Eastward, its centre lay over Newfoundland. By noon of the 5th the first cyclone had moved to the South-South-Eastward, and its centre lay over the Straits of Dover; while another cyclonic disturbance had made its appearance over the South-West of Greenland, taking in, as a secondary, a small depression which was then midway between Newfoundland and Ushant, and was advancing to the Eastward. On the 6th the Western coasts of Europe from Brest to Cape St. Vincent were under the influence of the second cyclone, its centre lying off Cape Finisterre; the first cyclone now forming another secondary, and lying over Germany, Holland, and Belgium. A fresh to whole gale prevailed from the North-East across the Bay, and from the North-West off Finisterre, and between that cape and Cape St. Vincent. This cyclone, with a group of secondaries, moving in a North-Easterly direction, and slowly filling up, gave rise to Northerly and North-Westerly gales until the 8th, when another cyclone appeared off Labrador. At noon on the 9th the Labrador cyclone had deepened, and on the coasts of Spain and Portugal a fresh to strong gale, South-West off Finisterre, and North off the Tagus prevailed, still controlled by the complicated wind system, arising out of the merging of the three depressions we have been following, and which was extant during the 10th. On the 11th the centre of the Labrador cyclone, around which the wind was blowing with hurricane force, was in 45° N. and 20° W. moving due East. On the 12th the centre was off Cape Finisterre,

and another low-level cyclone, lying over Newfoundland, was advancing to the Eastward. Consequent upon the passage of these and other cyclonic systems moving across the Atlantic, gales varying in force from 7 to 11, or having a velocity varying from 20 to 50 miles per hour, continued to blow until the 12th between the British Isles and Cape St. Vincent, and on the 13th across the face of the bay from North-West and West. Subject to the modifying effects of a somewhat extensive wedge of considerably higher pressure, winds between Ushant and Cape St. Vincent did not rise to a gale, excepting off the former Cape on the 14th; and off Finisterre, and South of Finisterre, as far as the Tagus, on the 15th. On the 16th winds were strong from the South-West between the British Isles and the Straits of Gibraltar, a small well-marked cyclone, whose centre lay about 500 miles to the Westward of Oporto, and a depression due North of it some distance off the coast of Ireland, gave rise on the 17th and 18th to strong gales from South-West, veering to North-West between Ushant and Cape St. Vincent. During this period, *i.e.*, from December 2nd to the 18th inclusive, pressure remained high over Scandinavia and Northern Europe, and the centre of the Atlantic anti-cyclone in about 30° N. oscillated between 20° to 40° W. Longitude.

The British Islands were, therefore, under the influence of the Easterly type of weather, and this period affords a good instance of that type of weather. Between the dates that have been given, then, naval operations against, or to be conducted in the vicinity of, any point between the positions indicated would have been impracticable. The data for the foregoing are taken from the Synchronous Weather Chart of the North Atlantic and adjacent continents, published under the authority of the Meteorological Council—a most valuable publication; and by these weather charts, from January 8th to 15th inclusive of the same year, it may be seen that during that period also a succession of low-level cyclones gave rise to severe gales, which on occasion rose to hurricane force over the British Isles and Western seaboard of Europe. These instances are cited because the weather charts referred to can be obtained; and when speaking further on of the possible effect which the existence of a certain type or types of weather prevailing during a prolonged period over our Islands might have upon the decisions of a naval strategist, I shall take my examples from the same source.

Roughly speaking, the shortest distance between two geographical positions across the ocean (with due regard to safe navigation, of course) is for all large swift ships of sufficient length the quickest route; but this is not the case with short vessels, such as our second and third class cruisers and vessels of a smaller type, for the speed of such vessels is soon retarded by the sea when it rises much before the beam. This fact has, I know, been recognised for many years past. During the full-speed trials of Her Majesty's Mediterranean Fleet in the summer of 1889 this was shown in a marked manner, there being a head swell to contend against at the time. After two hours, the "Benbow" steaming 16 knots, if my memory serve me, scooping up the water forward in tons, which dashing aft and meeting an obstruction in the fore barbette, curled

forward in a cascade, was many miles ahead of the remainder of the fleet. The "Colossus" and "Edinburgh," whose speed is given as 15·5 knots, came next (in what order I cannot remember); the "Dreadnought," to the best of my recollection, whose speed is given as 14·5 knots, was also in the running for a second place. The "Scout" and "Phaeton" cruisers, whose speed is given as 16·75 and 16·5 knots respectively, were astern of her. The "Benbow" had so far out-steamed the fleet after the four hours' full-speed trial, that it was difficult to distinguish and therefore to ascertain the relative positions of the remainder of the fleet. The "Benbow's" full speed in smooth water was 16·75 by log. The speed of the other ships mentioned is taken from "Brassey's Naval Annual" of 1887, their length, according to the same authority, being as follows:—"Benbow" 330 feet, "Edinburgh" and "Colossus" 325 feet, "Dreadnought" 320 feet, "Phaeton" 300 feet, "Scout" 220 feet. Length tells. In the case, then, of short vessels, which are making passages, those seamen know the way best and draw least upon the resources of their bunkers who have most studied the winds and their courses. In the navigation of the Indian Ocean, the China Seas, the Coast of Australia, and of South and South-East Africa, the saving of time and fuel by the adoption of routes prescribed upon an acquaintance with the meteorology of these regions is, as my own experience has taught me, most appreciable. For instance, the passage of a 12-knot steamship between Cape Point and Delagoa Bay may be shortened by about half-a-day by the navigator who knows how to escape the strength of the L'Agulhas current when Northward bound, and to take full advantage of it when proceeding South-Westward from the North; and his sea surface thermometer will generally give him almost as much information as to his distance off the shore as will his lead, and it will, sometimes, give him more. For an increase in the velocity of the L'Agulhas stream is, in all cases, attended with an increase in the temperature of the water, the strength of the current diminishing as the shore is approached. Changes during the various types of weather experienced along this shore occur in such regular sequence that the single observer may, with considerable accuracy, foretell the coming weather, as a rule, for about twenty-four hours at Cape Point, thirty-six at Recife and forty-eight at the Bluff, Natal. At Natal, during August, September, and October, notably, but occasionally at any time of the year, a ridge of high pressure accompanied with a good deal of cirrus in an otherwise cloudless sky, and a peculiar haze hanging over the horizon with dew after sunset are sure presages of atmospheric disturbance. The wind setting in from some North-Easterly point, light at first with slowly falling mercury, increases to a gale as the wind veers to the Eastward, when pressure gives way rapidly. As a rule, the barometer falls nearly an inch before the wind shifts to the North-Westward, from which quarter it blows hard, bringing rain as pressure increases. Usually after again shifting to the South-Westward the gale commences to abate, but occasionally with the mercury oscillating between 30·0 and 30·10 inches gales from West-South-West blow for as long as forty-eight hours, and in some instances with great violence, raising a tremendous sea and accompanied by a thick drizzling rain.

The foregoing may be considered generally as the salient features in the weather all along the South-East coast during the passage of cyclonic systems across or to the Southward of South Africa; but wind and weather are subject to innumerable variations, due to local causes on other parts of the coast. In what manner, it may be said, can weather forecasting in these regions be of any service to us in naval warfare? Well, an enemy raiding our commerce or attacking our ports upon that or any coast would be able to utilise to advantage signs that he could interpret premonitive of a change in the weather; and it is therefore certainly necessary that, in order to be fully prepared to meet an attack planned with reference to expected changes, the defenders should be in possession of all the local knowledge that can be gleaned. While remembering that there are ports North of Natal not British, who can say what combinations there may not be against us on those shores in the next European war in which we are engaged? There is, not far to the Northward of our possessions, on that coast a sheltered harbour, or, I should say, a group of harbours, in a sheltered bay—nature's one compensation, as regards harbours, for an otherwise harbourless coast—that is destined one day to become a most important outlet for a vast South Central African commerce, and as such, perhaps, to be fought for or fought over. There are few localities where meteorological changes occur with greater rapidity than on this coast, or where such changes can be foretold with greater accuracy; and it is for this reason that I cite it; but, unless recently established, no system of weather forecasting by means of synchronous observations, taken at a number of stations, has yet been undertaken, although the value alone to merchant shipping lying in the open roadsteads of Natal, East London, and Algoa and Mossel Bays would be enormous.

Familiarity with the trend of the currents on the shores of Australia and New Zealand is, in like manner, an essential in making satisfactory passages on an economical consumption of coal, and weather forecasting in these regions can be practised with much success not only by the weather worker with his synoptic charts at the different observatories, but also by the single observer, who has gained some knowledge of the tracks taken by those systems of high and low pressure, which, moving across Australasia mostly from West to East, have the making of the weather experienced, and of the corresponding changes which may be expected as they advance, recede, or recurve, according to his position in relation to their centres; which centres take a more Southerly route in winter than in summer, repelled by the higher pressures lying over Western Australia and immediately to the Southward of Western Australia which they encounter.

In one of the most useful works which has been compiled for the benefit of the seaman, "The Sailor's Pocket-Book," by Captain, now Rear-Admiral Sir Frederick Bedford, K.C.B., is given directions for making the inshore passage from Hong-Kong to the Yang-tse-Kiang by vessels of moderate steam power during the North-East monsoon.

By full-powered vessels, however, a less intricate inshore passage,

which may be made by the comparative stranger, was used by me some years ago for dodging the current, the wind, and the sea during the North-East monsoon on many passages between Hong-Kong and the Yang-tse-Kiang with complete success, and much saving of time and coal. It is not necessary for me to suggest the advantages the weatherwise would possess, who might have command of operations in the China Seas, and in those seas which lie adjacent. The Chino-Japanese war affords no criterion by which we can judge of the importance meteorology might assume in the conduct of naval warfare between highly-trained, well-matched belligerents that were quick to take advantage of every occurrent opportunity which modern methods might unfold for scoring a point. Two incidents should, however, be noted. The day after the first action, fought off Asan, "all the sea-worthy Chinese ships at Wei-hai-wei" (I am quoting Mr. W. Laird Clowes' account of the naval war between China and Japan, which appears in last year's "Naval Annual") "put to sea to look for the enemy, but remained out for only three days, since it was found the weather was very trying to the crews of the small craft, and especially of the torpedo-boats of the squadron." In strong contrast with this ill-timed sally in search of the enemy is the brilliant and successful torpedo-boat attack of the Japanese upon Port Arthur, waited for and cleverly carried out under the partial concealment afforded by a heavy rain squall.

In that valuable work the "Australia Directory," published by order of the Lords Commissioners of the Admiralty, a track to Australia from the Cape of Good Hope is recommended, which lies between the thirty-eighth and thirty-ninth parallels. When the work was compiled, there was much to be said in favour of this track, especially as applied to vessels that might suffer from the more tempestuous passage almost inseparable from a Southern route; but to adopt such a route for a full-powered vessel of the present day would be to exhaust the resources of the bunkers to no purpose, and to throw away valuable time. It may, one day, be necessary to reinforce our Australian Squadron, with all possible despatch, by vessels proceeding *viâ* the Cape of Good Hope, or from the Cape Station. According to the season, a vessel may advantageously shorten her distance between these two colonies by approaching more or less nearly the great circle track; and how shall he determine the quickest route who has not given his close attention to the subject? When the co-operation of his vessel was urgently required, the saving of a day or the possession of an extra 50 tons of coal, might become of the most vital importance.

A striking instance of the value of weather knowledge was presented early to me. Two gun-boats, sister-ships, were steaming between Monte Video and the Straits of Magellan. When between four and five hundred miles distant from Cape Virgins they became separated. It was night time, a Northerly gale was blowing, the weather was thick, and the mercury falling fast. One of these vessels in anticipation of a shift of wind to the South-Westward and a harder blow, was kept considerably to the Westward of her course until the wind shifted—which shift of wind occurred within twenty-four hours—in order to obtain the

shelter of the land, when the wind should have changed to the South-Westward. This vessel arrived at Sandy Point, in the Straits of Magellan, eighteen hours before her sister-vessel, which having been kept as long as possible on a straight course for Cape Virgins, experienced a terrible sea soon after the wind shifted. These vessels were the Mexican gun-boats "Democrata" and "Mexico," and were being taken out to Acapulco by Captain Harvey, R.N., under whom, at the time, I was serving. It was he who made the timely change of course.

Should any attempt at convoying be made in time of war, how necessary, in order to prevent separation when overtaken by heavy weather, that the commander should be able to caution his convoy in time of the coming change, and by a wise forecast be in a position to decide at once as to the best means of avoiding such separation, and while the opportunity is afforded him of making his signalled instructions intelligible to all! To give an instance in illustration of my meaning. In making the passage between the Far East and British Columbia across the North Pacific Ocean, the voyager usually comes under the influence of one or more of those low-pressure systems which traverse that ocean Eastward. Those who have experienced cyclonic weather on that passage will, I think, agree that, when encountering it, a convoy would be liable to become scattered, and some—perhaps many—of the vessels for the remainder of the voyage lost sight of in the thick weather with which it is generally associated, unless an acquaintance with the progress of these cyclones and with the shifts of wind to be expected in each quadrant of the stormfield, and last, but not least, a knowledge of the relative position of the centre of disturbance derived from watching the movement of the clouds, the direction of the swell, the veering or backing of the wind, and oscillation of the mercury, should enable the commander to determine upon the best means to be adopted under the circumstances, and to give instructions to his convoy accordingly. For the shifts of wind from some Southerly point in the van of the system to that blowing from the North-Westward in its rear, will be through North-East and North if the course of the vessel lie to the Northward of the path of the cyclone's centre, but through South-West and West if the course of the vessel lie to the Southward of the cyclone's path.

In crossing the North Atlantic, Southern Oceans, Bay of Bengal, and Indian Ocean, and in navigating the Gulf of Aden, and China Seas, the same argument obtains.

I believe our highest authorities on naval matters are in agreement as to the utility of the weather forecasts, which have been supplied when practicable to the fleet by the Meteorological Office during the naval manœuvres for some years past, and as to the importance such information would assume, were this country engaged in a war with one of our neighbours. Indeed, it appears patent to all that the strategist, whether naval or military, who during hostilities is being supplied with information concerning the state of the weather existing over a large area—an area that in some cases might have a radius of several hundred miles—and the subsequent

changes that will in all probability occur over such an area within, say, twenty-four hours, is being provided, to say the least of it, with a valuable ally. The vulnerable points upon our coasts will not be overlooked by the naval strategist in time of war, but, according to his ability to strengthen and protect them, will receive his aid in preparation for an attack and means for offering resistance.

In the defence, then, of these wave-lashed, wind-beaten shores, the assistance of our old allies, the elements, should be taken into account when considering the most advantageous dispositions, under various conditions, at different times of our ships and squadrons; and the more successful we are in gaining a knowledge of their movements, and the more we make a study of how best to reap the benefit of their mighty co-operation, the more valuable will be their alliance in the day of need. Unfortunately communication between the Meteorological Office and our fleets cannot always be maintained, even when the sphere of their operations lies in home waters. So also the arguments which confirm the desirability of mobilised fleets which are defending our shores being in possession of weather forecasts hold good also for squadrons acting elsewhere.

Without the aid of synchronous observations from a number of outlying observatories it is possible for a single observer, by means of readings of the barometer made frequently and at regular intervals, and by watching the movements of the clouds, more especially of cirriform clouds, and by noticing the direction and shifts of the wind, to obtain, in many cases, a fair idea as to impending changes in the weather; and this applies, not only to an observer situated in the vicinity of the British Isles, but forecasting with considerable success may be carried out by the single observer in other regions in like manner. In a little work entitled "Weather Forecasting for the British Isles," Captain Henry Toynbee, F.R. Meteorological Society, late Marine Superintendent of the Meteorological Office, explains very clearly and concisely how this may be accomplished, and the work will be found as useful as it is interesting.

It would be taking up too much of your time were I to cite the instances in various parts of the world that come to my mind, where a previous knowledge of coming changes in the weather might influence for good the schemes of a naval strategist. I shall, therefore, deal only with those cases that occur to me in connection with weather forecasting for the British Islands. It would be going far beyond the scope of this paper, as well as completely out of my own depth, to essay, even in outline, anything approaching a treatise on the means which should be employed to meet the special circumstances of the cases I shall bring forward.

What I desire to show is how the prevalence of certain types of weather, the indications of the approach of certain atmospheric disturbances, cyclonic and otherwise, a rough estimate of their intensity, and the probable direction of the path they were taking, might in future

naval wars affect the decisions of the strategist in his plan of attack or defence.[1]

A paper, contributed to the Royal Meteorological Society by the Hon. Ralph Abercromby, F.R. Meteorological Society, in November, 1882, "On certain Types of British Weather," marked a clear advance in the science of weather forecasting. It was pointed out by the author that the weather in this country often maintains, for weeks together, a similarity as to its general characteristics, and it was shown how the passage of low-pressure systems coming to us from the Atlantic were deflected and controlled by the position of a tropical belt of high pressure, now generally known as the Atlantic anti-cyclone, and also by the relative distribution of atmospheric pressure to the Eastward and South-Eastward of Great Britain, as well as in the vicinity of Iceland, and over Scandinavia; and that the weather experienced in these Islands, subject to the many modifying effects of local conditions, is directly related to such influences. Sometimes for weeks together certain types of weather prevail over the British Isles, associated with gales of more or less severity, and having certain signs of persistency, and regularity of sequence.[2]

During hostilities with some naval power when the Westerly or Southerly types of weather were prevalent, and the gradients of low-pressure systems coming in from the Atlantic steep, the defence of our Southern and Western shores would be in a measure simplified, and the necessity for strength on our East and North-East shores would be more urgent.

What would be the position of an enemy's fleet in the Channel or approaching our shores from the West or South-West in front of a low-level cyclone, travelling to the Eastward or North-Eastward, and what its condition in the rear? In the latter case, one of demoralisation, possibly. I may be wrong; but the picture projected before my mind's eye is of ships scattered by the exigencies of the hour, each after many unsuccessful attempts to preserve some required formation, obliged in order to avoid disaster themselves, as well as to one another, to take up the most suitable positions for the safe weathering of the storm, according to their class, power, and sea-worthiness.

---

[1] Mahan says, "In the days of sailing-ships, the English Fleet operated against Brest, making its base at Tor Bay and Plymouth"; and he goes on to say that in Easterly or moderate weather it kept its position without difficulty, but during Westerly gales when too severe they returned to English ports knowing that their opponents could not get out until the wind shifted. It may be said that steam has altered all that. The conditions are not altogether altered, but admittedly they are greatly modified.

[2] As Mr. H. N. Dickson, in his work on meteorology, expresses it:—"When, as frequently happens, the general distribution of temperature and pressure remains constant, a particular type of weather may persist for a considerable period, giving rise to prolonged spells of weather; and in these circumstances regions lying outside the cyclone tracks may have settled fine weather for weeks together, while districts traversed by them experience a succession of disturbances."

Ships that had been roughly handled during a heavy gale, would not meet on equal terms a foe that came out fresh from sheltered harbours to bring them to action. It may be that at the commencement of hostilities we should seal up an enemy's fleets by a successful blockade of their ports, so that a hostile fleet could not menace our shores, or even put in an appearance on the "Silver Streak." Forewarned of coming changes in the wind and weather, the blockader who could interpret the signals which Nature displays would have time to make the alterations in the disposition of his ships necessary to meet the altered circumstances.

It must be borne in mind that, usually the first intimation given of the existence of a cyclone approaching our shores, is the giving way of pressure over the West coast of Ireland, and that a hostile squadron might remain in ignorance of serious atmospheric changes, of which our shores and fleets had been warned many hours in advance.

From February 1st to the 17th inclusive, in 1883, severe gales from South-East, South, and South-West, were experienced over the British Islands, during which time the Southerly type of weather prevailed, high pressure existing over Eastern and South-Eastern Europe, and a succession of low-level cyclones were advancing from the North Atlantic, over the Northern portion of which ocean atmospheric pressure remained persistently low. On the 12th of this month off the North-West of Ireland, on the 13th off the North-East of Scotland, and on the 14th off the North coast of Ireland and the West coast of Scotland, the force of the wind was from 11 to 12, adopting the Beaufort notation, or from a storm to a hurricane, and its direction South-East; while the lowest reading of the barometer on the two later days, in a cyclone advancing upon our islands, was as low as 27·6 and 27·4 inches respectively, the wind blowing with hurricane force in the vicinity of its centre. The force of the wind had been from 11 to 12, on the 6th, 7th, and 8th off the North-East coast of Scotland, its direction South-East; and on the North of Ireland on the 7th, its direction South. Now I venture to say that a hostile fleet would have been compelled to quit our shores during the seventeen days referred to, had our own fleet permitted it to get there; but that, on the other hand, during a great portion of that time operations against some positions situated on the North coast of France might have been conducted—attacks by torpedo-boats, for instance; and that, in fact, occasionally the conditions of weather would have favoured the successful accomplishment of such operations, notably in the thick weather and drizzling rain which occurs with the first fall of the mercury in front of cyclonic disturbances during this type of weather.

In order to take full advantage of these conditions, the aid of the weather forecaster is necessary. An instance of the Westerly type occurred between November 17th and 28th, when the mean position of the Atlantic anti-cyclone's centre lay in about 40° N. Pressure was high over Greenland and Baffin Bay, low over Scandinavia and Northern Europe, and cyclones were traversing the Atlantic along a lane of low pressure in the "Col" formed between the Atlantic and Greenland anti-cyclones. Gales from West-South-West to North-West prevailed over the British Isles

with a considerable amount of rain in showers, on the Atlantic seaboard, but on the East coast of Great Britain the weather was drier and would, no doubt, in that type of weather have been clear, and the sea comparatively smooth.

A hostile fleet unable to cruise off our Western shores, would, under the lee afforded, be able, as far as the conditions of the weather were concerned, to attack our Eastern shores, if they could get there.

With a prevalence of the Northerly type of weather which, as Mr. Abercromby points out, occasionally follows and returns to the Westerly type by the merging and separation of the Northern and Atlantic high pressures, the South coast, by having a lee, would be more liable to an attack.

As an instance of the Northerly type, and keeping in view the instruction from a strategic point of view to be derived from it, the weather from March 4th to the 14th of the same year may be cited as an example, when an area of high pressure lay to the Westward of the British Islands, extending from Greenland to the Azores, and depressions were forming over Eastern and South-Eastern Europe. It followed on a spell of moderate winds and fine weather, when our Islands lay under influence of an extensive anti-cyclone, and during which period, so far as meteorological considerations were concerned, naval warfare might have been carried on as though the season had been summer. Under similar conditions the naval strategist operating in the North Sea, whether attacking or defending, blockading or blockaded, cognisant of coming change and of the probable nature of the change, would be in possession of useful information of which he might make considerable use. For the blockader might send into shelter his torpedo-boats and those ships of his fleet as would suffer in the Northerly gales such as followed and were accompanied by rainy, bitter weather. Or if blockaded, he might utilise his knowledge in preparation for, and in a timely attempt at, effecting the escape of some of his ships. Pressure gave way to the Southward of our Islands after the 14th, after which the Easterly type prevailed for many days.

Low-level cyclones, it may be objected, are not always advancing upon the British Isles from the Atlantic, even in midwinter. No; but during certain types of weather and during certain seasons of the year they occur frequently, and often recur in quick succession.

The first blow in a war in which we might engage may be struck at any season of the year, the scene of operations might be the English or St. George's Channel, or the Irish or North Sea, and an attack upon our shores, or a naval engagement fought near our shores, is a possibility in January as well as in June. A hostile fleet operating in the North Sea, far from its base, would fare badly indeed during the months of winter or early spring when the Easterly or Northerly type of weather prevailed, and while low-pressure systems were advancing from the Atlantic, or forming in the East or South-East. Yet, as a rule no such considerations should prevent operations on the West and South-West coasts during that period; but on the contrary, the pitch-dark nights and gloomy skies might afford good opportunities for successful surprises, necessitating extra vigilance and

more stringent measures for defence. In making an attack upon some point on an enemy's coast, considerations of coming weather accurately foretold might determine with advantage the time for, and the method of, making the attack, and in most operations with torpedo-boats against an enemy the chances of success would be much improved by a knowledge of the weather in advance. And such being the case, the importance of weather forecasting when planning such attacks is evident.

An escape of ships from a blockade—planned in view of a dark and dirty night, and waited for until foretold—under some circumstances, if effected, for instance, when co-operation with a squadron, also in possession of the forecast, and already apprised of the intended effort, might turn the strength of the opposing squadrons against that of the blockader, and would, in any case, give a more hopeful prospect of accomplishment than a hastily devised attempt. Since the naval manœuvres of 1889, the practicability of coaling ships at sea has not, I believe, commended itself to naval officers. In future, however, means may be devised by which it can be effected with facility. Those who have witnessed the working of cargo between ship and lighter in the open roadsteads of South Africa, or the experiment of a steamer brought and kept, more or less, to the wind, during heavy weather in the North Sea and elsewhere by her cable chains, or have had some experience in telegraph cable-work, will not despair of a successful solution of the problem. The question of coaling at sea is, however, a wide one, and although its importance cannot be overlooked, an investigation as to its feasibility lies outside the limits of this paper, and it is brought forward only as being an additional instance of the value of weather forecasting in the event of its applicability during future operations; for in all preparations to that end the question of coming weather amongst other considerations would be one of great importance, as, for example, in the saving of time by preparedness particularly when the coaling of a large number of ships had to be considered in a blockading fleet.

In the Gold Medal Prize Essay upon "Lessons to be derived from Operations of Landing an Expeditionary Force on an Enemy's Coast in past Wars," the author, Major Elmslie, R.A., referring to the British expedition to Rochefort in 1757, quotes a letter written by Wolfe, afterwards the Great General, an accomplished strategist, in which he says, *à propos* of what lessons he has picked up during the expedition, "I have found that an admiral should endeavour to run into an enemy's port immediately after he appears before it." This maxim holds good to-day.

On any shores where, in consequence of tempestuous weather, the operations of the invader might be liable to postponement or interruption, premonition of the weather by a reliable forecast would prove of incalculable value to the commander of an expedition entrusted with the landing of forces; for, to appear on the scene when circumstances would not admit of operations being commenced, would be to invite opposition, and to rob the incursion of such benefit as might be derived from surprise.

Rear-Admiral J. F. MACLEAR: I am very glad that this subject has been brought forward, and although Lieutenant Hepworth has so modestly deprecated his own powers to deal with it, yet I think I may say, speaking as a Fellow of the Meteorological Society, that he is an exceedingly capable man for taking up the subject. The study of wind and weather connected with naval operations is very important. Although ships are no longer propelled by the wind, yet that is only an element of chance eliminated. We know how very much wind against a ship stops even the most powerful steamer. In naval operations it will be necessary not that the vessels should start in fine weather, but that the vessels of a squadron should arrive at the point where they operate in weather that is suitable for their purpose, and the speed that they go at would be determined entirely by the wind and weather they had to meet. One would think that if any ship could neglect wind and weather it would be the great mail steamers—those that run across the Atlantic, for instance. But we find that the American liners take weather very much into consideration. The captain of a vessel I went across with made a very great study of the weather that he would meet on the coast on both sides, and especially of the fogs. He took care to note from time to time where he met fogs, how long he was running through them, and what the size of the fog was, and he came to the conclusion that the general size of a fog in the Atlantic was about thirty miles in diameter, and he could run through it in a certain time. There were two sorts of fogs he had to encounter. One was the thick, low fog, with a fairly bright sky overhead, and the other a dense mist. He could calculate, generally speaking, how long he would be in each, and whether it was better to run through it at full speed and get out of it, or to go slow and wait for it to lift. Such considerations as these are very useful to a naval officer, if he wants to get out of a fog or hide himself in one. I can give another illustration in connection with the paper. The captain of a steamer going from Hong-Kong to Australia was told that he must arrive at the port in Australia before another vessel which had started a day before him, belonging to a rival company. He studied the chart and the weather chart very closely, and he found that by going through a certain passage, and making use of the N.W. winds, he might catch that vessel up. He chose this new passage, took advantage of the wind, and got in half-a-day before the other ship. Such knowledge as this is very necessary to the naval officer also. Those illustrations Lieutenant Hepworth has given of the weather to be encountered, and of the importance of studying the weather on our own coasts are so apposite that I need not say anything about them. But there are one or two things about passages, especially on the coast of Africa, off L'Agulhas, where there is sometimes a hideous sea raised when the current is running against the wind, a sea that a short ship has no chance against. You can do nothing. She is tossed about like a cork on a ripple, and it is important for a man to know whether he will get out of that current by running in-shore or further off. It will make all the difference in his passage. There are other places on the West coast of America where it is of great importance to a seaman to know whether he should stand close in-shore or keep further out, whether he will get the currents, or tides, or sea in his favour or against him. I think these are especially important to a man-of-war, where a man has to get to a certain place in a certain time. I might say that the knowledge we have of currents and the weather to be expected is nearly always obtained from the remarks of naval officers and other seamen. It is frequently said in the Navy that the remark books of the captains sent in are put aside and never looked at; but I can assure naval officers sending remark books that very useful remarks are often found in them, and very great knowledge of how to conduct passage. I have often, in studying the book, found that a man, in giving particulars of his passage up a coast, makes the remark that another year he will take another passage or another route, and he gains so many hours by so doing. All that is important. There is one point where I do not hold with Lieutenant Hepworth. He alludes to the Admiralty track of a passage from

the Cape to Australia, and deprecates the 39th parallel. It is true that a vessel running further South than that will have a shorter distance to run, but she has got a heavy price to pay for it in strong winds—not steady, sometimes blowing very hard, sometimes light, with a very heavy sea. I do not think many of the steamers of the present day would like to encounter such weather as they would get by great circle sailing in that latitude. I think they would arrive with more coal and in better condition for fighting if they adopted the Admiralty 39th parallel.

Mr. R. H. SCOTT, F.R.S. (Secretary of the Meteorological Office): I have really very little to say. I have listened with great interest to Lieutenant Hepworth's paper. It appears to me the outcome of the whole thing is that the naval officer should study meteorology as much as he possibly can in all parts of the world. As regards the idea of getting forecasts in time of war, I had a good deal of experience of that more than twenty-five years ago, for at that time the responsibility was thrown on our office of issuing intelligence of weather to the entire French coast. The French naval officers believed that Admiral Fitzroy, being a naval man, was more likely to be a good judge of weather than any landsman, and, moreover, considered that his mantle had descended upon me. But, however, be that as it may, the whole telegraphic service in France was, of course, disarranged during the war, so that no warnings could be sent to the coasts. If any serious attack occurred on our own coasts, it is perfectly certain that all the telegraph lines existing would be very much used for military purposes, and not for meteorological purposes during the time hostilities were going on. I fancy the Forecast Service would be decidedly interfered with by any very serious danger of war even on our coasts. It seems that we are not one atom improved in the way of weather knowledge from the condition of things of the old wars in the beginning of the century. The man who knows best about the weather and knows best about handling a ship in all weathers has a great advantage over a man who has not gained that knowledge. I think that every captain will be thrown on his own observation and his own knowledge, and cannot rely on getting information from outside. With reference to this question about the types of weather, I do not think that anyone can at the present day say for certain what the weather is going to be two days hence. It is perfectly well known that no one attempts to give forecasts for more than twenty-four hours in advance. It is also very well known if there is a hard frost it may take some little time to break up, but as to saying it is perfectly impossible at any time to have a storm in a couple of days, I do not think anyone would feel in a position to say that. In my opinion, it simply remains that the officer in charge of any squadron must use his own judgment as to what he can do or what he cannot do. If an enemy's vessels are outside, he must do what he can, no matter what the weather is, to prevent their doing any damage.

Mr. CHARLES HARDING, F.R.Met.Soc.: I should like to make a remark or two, having taken a good deal of interest for many years in seamen's work. I have listened with considerable interest to Lieutenant Hepworth's paper, and I am sure he has done good in bringing before seamen of both the Royal Navy and the Mercantile Marine the deeper study of meteorology, and it is from that standpoint, I think, this paper is chiefly of interest. Following the paper, it occurred to me that he was, perhaps, expecting rather too much of seamen as far as knowledge is concerned, knowledge in advance of what should happen, and he has handled very thoroughly certain types of weather and cyclonic and anti-cyclonic conditions after the fact. The seaman would, of course, have to take action at the time of the occurrence of weather changes, which is very different to deciding what he should have done when the full knowledge of the changes is before him. Lieutenant Hepworth referred to certain types of weather which are shown in the volume of "Charts"

published by the Meteorological Office, and I should like, in passing, to emphasise what Lieutenant Hepworth alluded to, as to the high value of these charts. There is no doubt there is a very vast amount of information in those charts for seamen who are studying them. You have there pictured the behaviour not only of storms but of the more ordinary weather changes; you have in those charts observations from 400 ships per day for thirteen months taken at the same moment of time; therefore you have a genuine picture of the changes that are going on. So far, so good; but it seems to me for a commander in charge of a man-of-war to take full advantage of similar conditions of changes of weather he must make himself thoroughly familiar with the changes which those charts show. I take it that is the standpoint which Lieutenant Hepworth has taken up, and in doing that he is doing a large amount of good. At the same time, Mr. Scott naturally called attention to the fact that a man at sea—a captain—must be left to the knowledge he has of what is likely to happen, and his judgment must depend entirely upon himself, and upon no outside source; but, of course, the greater a man's knowledge of the changes which are likely to occur, and of the changes which do occur, the more likely that man is to make a correct judgment of what will occur, given the conditions. I may mention one or two points, with your permission, with respect to the general conditions which prevail over the ocean. With regard to the value of the information relative to cyclones, it is all very well to say, and I would not for one second speak disrespectfully of what Mr. Scott has just said, that we cannot forecast the weather for thirty-six hours in advance, but we know that if a cyclone passes over a certain part of the country the conditions are favourable for the cyclonic formation. You have an area of high barometer, we will say, over Europe, and you have conditions favourable to a cyclone reaching you from the Atlantic. One arrives on the North coast and skirts it, and another one will be almost certain to follow. You have those hints at all events, and although you do not know what will occur, you know the conditions are favourable to the arrival of cyclonic areas, and it is very probable indeed they will arrive and follow very much in the same track. That is the sort of information that would be very greatly of value in the direction indicated by Lieutenant Hepworth. To leave that point for a moment, I was very much amused only yesterday at seeing some recommendations in a certain publication known well, no doubt, to most here, *i.e.*, the "Pilot Chart," published by the United States Navy; there is in the "Pilot Chart," for the month of February, an inset chart, and that inset chart gives the prevailing winds, and the best routes for sailing ships round the Horn, out and home. It tells vessels in coming home to keep round the Horn and then to the Eastward of the Falklands. Of course it is not necessary—I say it with all respect to you, Sir, in the chair—for merchant seamen, either Englishmen or of any other nation, to teach our Admiralty sailing directions; that is not the object, I think, of Lieutenant Hepworth's paper; it is not to indicate to naval men who know, perhaps, more on this subject than mercantile men what they should do for the purposes of navigation, but only to throw out hints in the direction in which some information may be obtained. But that chart, from a naval point of view, is absolutely wrong. If you look at our own Admiralty sailing directions they advise you not to go to the Eastward of the Falklands, but to keep to the Westward; and we all know during the last three or four years there has been a very large amount of ice in the Atlantic, and vessels which followed the "Pilot Chart" would have stood a good chance of coming into collision and being endangered by that ice. I merely mention that as one instance of the advantage of a knowledge of different routes. Then there is another. Lieutenant Hepworth rather laid stress upon the route between the Cape of Good Hope and Australia. Admiral Maclear has alluded to that; if a vessel does stand to the Southward of the track, as recommended by the Admiralty, she is liable to get into heavy weather and stronger winds—favourable, but, still stronger. But allow me just to keep you in the same ocean and take you in the opposite

direction, and there something is to be learnt, and will be learnt, probably, in the next few years in that direction, in consequence of certain charts, which the Meteorological Office now have well advanced, and which will be very shortly published. Facts which have been known before are brought more clearly to light by the charts now in hand. A vessel leaving Australia and wishing to get to England would save a good deal of time very often in several months of the year by running round the Cape of Good Hope, but she must not keep along 39° or anywhere there; she must go to the Northward. Of course, it will be evident to everyone here if she keeps down South she will have head winds, but there is an area of high pressure in that ocean the same as in all other oceans, and that area of high pressure is situated, roughly, between 30° and 35° South, and if that vessel approaches an area of high pressure, she will get into quiet weather, and probably, by going far enough North she might get favourable winds; but I do not know whether that is to be recommended. As long as she has quiet weather and no head winds she will get what she wants, and there is no doubt by making that track from Australia a great deal of time will be saved under certain conditions. Although I do not take exception to much that Lieutenant Hepworth has mentioned, I should like, in conclusion, to give a caution on one point. He has alluded to the L'Agulhas current. He speaks too highly, I think, of the value of the surface temperature as an indicator of your nearness to the coast when in the L'Agulhas current. I think that is rather dangerous. No doubt the thermometer does show when you are in the L'Agulhas current, but he speaks of it too strongly; and, I think, to say it is a better indicator than the lead, would be very unsafe for the navigator to rely upon. It has been thought by many that the thermometer is a better indicator than the lead of your being in proximity to Cape Guardafui, in the time of the South-West monsoons; but that has been proved to be false, and I think the statement made in that direction by Lieutenant Hepworth would hardly bear thorough inquiry.

Lieutenant HEPWORTH, in reply: I am glad to find Admiral Maclear agrees with me almost throughout, with the exception of the track to Australia from the Cape. I have had to take the more Southern track, because I found it so very much better. I do not think myself the weather is so very much worse in going South. What you want to do is to study your track. The centres of low pressure which traverse that ocean take a more Southerly route in the summer than they do in the winter. In the summer you can go down South as far as 45° or 46° with really good weather, and my experience is that in the winter you can also go down as far as 43° without getting anything very bad. As you go South, the only thing is you may get the wind from the Eastward, and the gales, instead of commencing at N. or N.W. and working round to W., begin at N.E. and work round to N.W., so that you get adverse winds occasionally. Sometimes when you want to make your Northing, you get the winds from the N.E., which keeps you back a bit; but, as a rule, I take it the best route all round for a vessel which is not of full power, which does not steam so much, we will say, as 12 knots, the best track would be 42° or 43° S. in winter, and about 45° or 46° in the summer. That is roughly. I have not found the weather so very much worse when adopting those routes.[1] The only time I ever made the passage to Australia in 39th parallel—I was compelled to do it—I had rather worse weather, I think; certainly I had a high sea without the corresponding high wind. The sail on the ship was, therefore, not much use in steadying her. I think Mr. Scott is rather too modest. I consider that, in the time to come, the department which he directs so ably will be able to give a great deal of assistance to the strategist. I do not mean to

[1] I should state that, in making the passage in a full-powered steamer, I usually make the Easting between the 47th and 48th parallels, or further South, disregarding the possibilities of encountering Easterly winds.

say that the entire disposition of ships is going to be suddenly altered because a telegram arrives from the Meteorological Office, but I mean that, generally speaking, one part of the coast can be strengthened when it is under a lee, and that vessels might be taken from those districts where heavy weather is expected and dispatched to some particular part of the coast. What Mr. Charles Harding said about ice is very important, and some very valuable ice charts have lately been published by Mr. Russell, the Government Astronomer in Sydney, in a paper he gave to the Royal Society of New South Wales. As Mr. Harding says, vessels taking the Eastern track after passing round Cape Horn have fallen in with a great deal more ice, whereas by keeping West of the Falklands very little ice has been seen. The homeward track from Australia also is important. One line of steamers already has commenced to take that track. All their steamers return by the Cape of Good Hope instead of going through the Canal, and they make very good passages. With regard to the surface temperature, the reason I make such a strong point of it is that I find the use of the thermometer on that coast very useful. For some years I ran between Cape Town and Natal. In thick or hazy weather and at night I used to find great assistance from the surface temperature. I found the temperature went up when I was getting off the land and out into the body of the L'Agulhas stream, and as I got a lower temperature so I found I was approaching the land. I never knew it fail excepting between the Aliwall Shoal and Natal Bluff.

The CHAIRMAN (Vice-Admiral Colomb): Before offering in your name the thanks of the meeting to the lecturer, I believe it is usual that the chairman himself should make some observations on the lecture and the discussion. I think that Lieutenant Hepworth does good service in coming to this theatre from the mercantile marine to put before us a question of this sort. In the mercantile marine in times of profoundest peace they are always making passages at speed and endeavouring as far as possible to economise fuel on those passages—to do the two things together. In peace-time in the Navy we have very little, if any, experience of that sort of thing. But in war-time I take it that we should be doing very much the same kind of work, with very much the same objects in view; not having in view the financial economy of coal, but the necessity of retaining coal on board when the passage is completed. And, therefore, I think he would tell us, and rightly tell us, that we have not done with the old questions of winds and currents so much, perhaps, as we might otherwise be tempted to suppose. I think, speaking generally, that he does not press his point beyond that. He comes to us to say "I believe that in your experience in the Navy you might be disposed to forget that you have not done with these things, and that it is desirable that you should keep them in view, because you will have to put them more or less in force should war come." As to the usefulness of forecasts of the weather for operations of war, Mr. Scott tells us he could not help us very much, but still I think that in operations against the enemy's coasts, not far from our own shores, not far from the Meteorological Office, before such expeditions started, we should press Mr. Scott very closely to know what the chances of weather would be. As the lecturer quite properly points out at the close of the paper, very often the success of expeditions against the enemy's coasts depends upon the success of the surprise. Through being delayed by weather, as so many of our expeditions have been in times past, exactly as they would be delayed now, that is, from the surf on the shore being too great to allow boats to land, we should miss the surprise. I think that we should, before any such expedition started from these shores, endeavour to get the forecast, in order that we might make sure of having smooth water on the shore when we reached it. Those are the points which struck me chiefly in listening to the lecturer. It will be found when this paper gets on board our ships, in the JOURNAL, that it will be carefully read by many naval officers. I believe the general opinion will be such as I venture to express on your behalf,

that it is a useful paper, and that we are exceedingly obliged to the lecturer for having come forward to read it. I now offer to the lecturer our very best thanks for the paper which he has read.

THE NECESSITY FOR AN ARMY AS WELL AS A NAVY FOR THE MAINTENANCE OF THE EMPIRE.

By Captain W. H. JAMES, late R.E.

Thursday, 27th February, 1896.
Field-Marshal VISCOUNT WOLSELEY, K.P., G.C.B., G.C.M.G., Commander-in-Chief, in the Chair.

A COUNTRY not secure from its natural position, nor certain of aid from friendly allied Powers, must depend entirely upon itself for safety from attack. Three months ago most of us believed that, at any rate from two nations, we might look, if not for aid, at any rate for benevolent neutrality; but recent events have shown that neither the traditions of a long-standing alliance, from which the chief benefit has certainly not been derived by this country, nor kinship of race, will avail against the political exigencies of the moment. The result has, I believe, been beneficial. The whole nation at last has begun to appreciate the fact that the maintenance of the Empire depends on our own fighting strength, and that this must be duly ordered in accordance with our requirements; while throughout the Empire a cry of loyalty has gone up which, if properly taken advantage of, will lead to such organisation of our resources as to leave no cause of doubt for the future.

At the outset I wish to define my position with regard to the relative parts to be played by the Navy and Army in the maintenance of the Empire. I should be the last to seek in any way to depreciate the part our Navy has played in the past, or to do anything which would diminish its *rôle* in the future. I fully agree, my lord, with what you said on a recent occasion, that if either Service has to go short we must insure that the Navy is not stinted in any way. The Navy is our first line of defence, and our existence depends on its continued efficiency. The task imposed on it is a heavy one, and one that does not tend to become lighter. New obligations, owing to enlarged territories, have increased our responsibilities, while we no longer possess the unquestioned sea supremacy which was formerly the case. For the Navy of France is now, relatively, stronger; Germany, Austria, Italy, and Russia have become important sea Powers; the United States have much increased the value of their fleet; while in Japan a new sea Power has come into existence. During the eighteenth century, and at the beginning of this, we were from time to time opposed to France, Spain, Holland, Russia, and

Denmark, on the sea; but the fleets of Germany, Austria, and Italy were non-existent, and that of Russia was an almost negligible quantity. We suffered some reverses at sea from America in 1812-14, but only in ship—not fleet—actions.

The importance of the Russian Navy is increased by the fact that the growth of the Black Sea Squadron, formerly inferior in strength to the Navy of Turkey, has placed the latter Power at her mercy, and thereby rendered it easier for the former to come into the Mediterranean. Moreover, Russia now keeps a special squadron in the latter sea. It is evident, therefore, that on the sea we may have to deal with a more formidable combination than was the case a century ago, while the enormous expense of modern ships renders the strain of keeping up a proper Navy far greater than in the days of wooden vessels.

But if we are to maintain the Empire, to support the outlying members of its body politic from attack, and secure the safety of this kingdom, which forms the centre of our vast possessions, it must be done. The *first line of defence* is the Navy, and there seems every disposition on the part of successive Governments to put it on a proper footing; and I do not, therefore, intend further to allude to it beyond saying that no mere arithmetical superiority will suffice. It must be a practical and not theoretical supremacy. At the outbreak of a war we shall have to fight for it, and it will be impossible for our country to regard herself as the Mistress of the Seas until she has swept her opponents from the ocean.

I propose to show you, however, that the Navy alone will not suffice; it must be supplemented by an efficient Army, which is the *first line of offence*, and it is necessary, for this purpose, to organise the fighting forces of the Empire into one harmonious whole. For the history of our race shows that it is only from the conjoint action of the two branches of our armed strength, combined in due proportion, that the best results have been obtained; while our records prove most clearly that the need for an efficient Army, proportionate to the tasks it may be called upon to do, has never been properly appreciated by our rulers, or by the people. Undeniably great as were the achievements of the Navy at the beginning of the century, I think we are somewhat inclined to put them at too high a value, to forget that, if the Navy saved us from invasion, there is something to be said of the folly which rendered it possible for the landing of 120,000 men to mean the conquest of the kingdom because there was no proper Army to meet them.

We are proud, and rightly proud, of naval victories in 1805, but we must remember that in that year Napoleon was only at the beginning of his great campaigns, by which he was to form an empire, the like of which has never been since the days of Charles the Great. From 1805 to 1814 we were at incessant war with him; from 1807 no organised French fleet existed. In 1811 Lord Minto announced that the French flag was nowhere to be seen flying from Cape Comorin to Cape Horn. And yet these nine years were the greatest of the Emperor's life; and from 1805 to 1812 his career was practically one of almost unchecked conquest.

Trafalgar was an event of the highest importance, but it was fought the day after Mack surrendered at Ulm.

Putting aside inborn fighting capacity, the military strength of a nation depends upon :—

1. Population.
2. Organisation.
3. Wealth.

Judging by the standard of population, we are in a very favourable position; for the white population of the British Empire, which alone numbers some 50,000,000, is larger than that of France or of the European portion of Russia, and is almost equal to the white population of America; while the total population of the Empire, about 350,000,000, is larger than the total population of Europe. It is true that of the total population 300,000,000 belong to alien races, which could not be organised on the same footing as the white population; but our position in reference to population is nevertheless favourable.

In the United Kingdom the Sovereign has the undoubted right to call on all able-bodied males between fifteen and sixty to defend the country, but no attempt has ever been made to organise them so as to render them fit to meet a foreign foe.

It is idle to imagine that we can rely merely on the numerical strength of our population, and that when the struggle comes we can organise. Within recent times we have had two striking proofs of the futility of such a policy. Take the case of the American Civil War. The reason why it lasted so long, and was so prodigiously expensive, was that neither side had any adequate military organisation; both sides at the outset were ignorant of war. The staff, as a rule, could not plan, the officers could not lead, and although they and their men were brave enough, ill-directed bravery alone can produce no decisive results; and it was not until taught by the bloody experience of the contest, that the necessity for proper organisations—in short, for an army as opposed to an armed mob—began to be appreciated. I do not hesitate to say that up to the end of the struggle the average American officer was by no means the equal in military knowledge of the average regular army officer in Europe. Had the North possessed at the outset 70,000 or 80,000 regular troops the struggle would not have lasted six months. I believe, moreover, that 100,000 regular European troops thrown into the scale in 1862 or 1863 would have at once terminated the war. Yet America raised on the Northern side alone 2,300,000, a considerable portion of whom "were enlisted, organised, armed, equipped, and sent into the field in less than a month"! I quote this from official documents.

Again, look at the war of 1870-71. After the capitulation of Sedan, the war was carried on by the French mainly by newly-raised levies. These, badly organised, for good organisation was impossible in the time available; ill-officered, for sufficient good ones were not obtainable; armed for the most with a heterogeneous collection of weapons, with no proper train services, and directed mainly by three civilians totally devoid of all military knowledge, were led only to disaster. The men suffered

terribly, and were unable to meet anything like their own number of regular troops in the field; and although they struggled on bravely for five months, the result was no better terms than could have been obtained in the beginning of the final phase of the struggle; so that France poured out her treasure like water, and offered up life without stint, without obtaining thereby the least benefit.

Numbers then, without organisation, are useless, and serve only to give a fictitious appearance of strength without in any way adding to the real war capability of the country, and we must not rely on them. Moreover, modern war is so sudden, owing to the facility of communication, which permits the easy concentration of vast numbers; while these numbers make it so costly, as to render it essential to bring it quickly to an end by carrying on the conflict with the utmost rigour possible. A nation that cannot spring forth fully armed for a conflict is certain to be beaten. It will be given no time to construct an Army or a Navy when war has begun. The possibility of doing so saved our forefathers in the past; belief in such a possibility, if we continue in it, will be our ruin in the future. And yet I am sure that the idea still exists largely in England that, somehow or other, we should come out victorious in the long run. For it is only a few days ago that I read in an evening paper the following lines:—

"It must occasion grave misgivings to French politicians to mark the rapid increase of the populations of Germany and Great Britain, while that of France is absolutely stationary, even if there is not a retrograde movement. Frenchmen who are accustomed to depreciate the military power of England do not reckon upon the fact that the population of this country is three times as great as it was when we wrested Spain from their hands, arrested the tide of victory, and finally dealt the heaviest blow at the power of Napoleon. It is true that late Continental wars have been comparatively short, but, from our island position, were England invaded, no such speedy overthrow would be possible as that of Austria by Prussia, or France by Germany. And in six months from the declaration of war England would be able to place a force at least equal numerically to that of Germany or France in the field. Every year adds to our population, and to our wealth. In another three or four years we shall have paid off nearly half the £900,000,000, at which our debt stood at the close of the great war. Those who deem that the military strength of England can be gauged by that of its standing Army at the present moment would have a very bitter awakening, in case of war."[1] The man who wrote this had certainly never studied the Franco-German War, and does not understand the way in which the heroic, untrained efforts of France, were slowly but certainly crushed by the organised might of Germany.

Our population is sufficient to provide a proper Army; it is our organisation which is now, and always has been, defective and inadequate to the duties required of it.

[1] *Evening Standard*, February 7th, 1896.

For, be it remembered that, from the days of Agincourt to the present time, we have never fought on the Continent without allies, *i.e.*, our military strength has never sufficed for the duties that our position in Europe has imposed on it. Where should we have been in the Peninsula without our German and Portuguese troops? Do we at all appreciate the fact that at Waterloo we had only 24,000 British troops out of the 67,000 on the field, in the Anglo-Belgian-German Army commanded by Wellington? Do we remember how hideously our military system broke down in the Crimea, and that we endeavoured to supplement our deficiencies by the miserable expedient of the Foreign Legion? Our military system never has given us the numbers we require, and statesmen never seem to have appreciated the fact that we require an Army somewhat proportionate to the task required of it.

Had we possessed an adequate Army, the career of Napoleon might have been brought to an end in 1807. This year was the second phase of Napoleon's invasion of Prussia. In 1806, he had swept all before him, and the Prussian Army had surrendered at Lübeck and Prenzlau. But in the beginning of the next year, he had to deal with the remnant of the Prussian forces, and with their Russian allies who had come up to help them. He fought the battle of Eylau on the 7th February, which, to say the least of it, was a very doubtful victory. The weather was terrible, and the French in a sorry plight. At this juncture, Russia begged us to help them in that struggle. Had we had a properly-organised Army available to aid our allies, we should, in all probability, have driven Napoleon back to the Rhine; but while we were organising and hesitating, unable to make up our minds, there came the French victory of Friedland, and our opportunity was gone. Had we been able to act, how many hundred thousands of lives would have been spared! how many millions of money have been saved!

Look at the enormous effect of the Peninsula operations on the final fate of Napoleon. Surely it is impossible to study them without seeing how largely it was—to use the Emperor's own words—the Spanish ulcer which wore him to death. Had we concentrated our whole strength on the Peninsular War, instead of frittering it away in ridiculous expeditions devoid of utility, the success or insuccess of which could have had no possible effect on the main struggle, we should have entered France at the end of 1812. Prussia would have risen. Austria must have joined, and the Emperor would have been crushed then two years earlier than he was. We were unable to do so, because we had no proper military organisation, and because our statesmen did not understand war. Again, I assert that want of knowledge cost millions of money and hundreds of thousands of lives. English statesmen require no monuments to keep before us their military achievements—the national debt is a standing reminder of their incompetency.

Let me give you one more example of what the want of proper military organisation has cost us. I refer to the American War of Independence. It began in April, 1775, when we had some 10,000 men in the country. We raised our strength to 13,000 chiefly by means of foreign

mercenaries; but I do not believe we ever had 15,000 on American soil. Now, until 1778, when France turned against us, we certainly had the command of the sea, and could, had we possessed any adequate military organisation, have put 50,000 men in the field, which would have settled the question. We did nothing of the sort, and in that year, 1778, we even took 5,000 away to conquer St. Lucia, St. Pierre, and St. Miquelon —a striking example of the fatuity of our rulers.

Of course, when we allowed the sea supremacy to fall away through want of a proper Navy, our failure was a mere question of time, and it was appropriate that the country which could not take advantage of its opportunities should have seen the last remnant of its military forces surrender at Yorktown, because the fleet was not strong enough to break the blockade of the river. We spent £100,000,000, we lost territories and prestige in that struggle, terminated after eight years by the peace of Versailles, because our statesmen were absolutely and entirely ignorant as to how they should make war, or that an Army was wanted for it.

How are we situated with regard to the third element of strength—money? We are the richest Empire on earth; year by year we are increasing our possessions or developing their resources. Time is, in this respect, on our side, and as we grow in riches the burdens necessary to ensure our independence must become relatively lighter. Are we not rich enough now to spend what is necessary for our security? I believe this point to be unworthy of discussion. Compare our wealth now with what it was a hundred years ago. Compare what we spent then with what we spend now, and see whether there is not ample margin for the purpose.

I hope I have shown you that in our past history we have needed an Army, but that our military organisation has never been adequate to our requirements, and I believe that anyone who studies the history of the Empire must agree with me.

Why have we never had sufficient military forces, and have only just woke up to the fact that a Navy is necessary? It is attributable to three reasons:—The first, that the estimates of the two great "spending departments," as they have been foolishly called, have always formed the happy hunting ground of Chancellors of the Exchequer in search of a surplus; the second, that this country has not been engaged in a struggle for existence for eighty years; the third is the fact that the study of history is absolutely neglected in English schools.

Statesmen and voters alike are densely ignorant of the process by which the Navy and Army have built up the Empire, and of the position we hold with regard to our Continental friends—or rather enemies. The first have sought popularity by parsimony in peace, to be followed by prodigality in war; the second have had a sort of blind confidence that somehow or other the country would pull through. Neither have noticed the alteration of the conditions of existence of nations and the enormously increased military strength of possible opponents: France and Germany can now each put 3,000,000 in the field, Russia 2,500,000, Austria 1,500,000, Italy 1,000,000. The altered position on the sea I have already dealt with.

War now will be an affair of months—not years; and woe to the nation that is not ready for it.

We are now putting our naval house in order, but the foundations of our military edifice have only been partially laid, and the whole structure requires erection on a proper basis.

Our population and our wealth permit us to meet our needs in this direction, and I have now to show you what an Army is wanted for, including under this head all the land forces of the Empire.

What are their duties?[1]

1. To render it impossible for an enemy to land in the United Kingdom without the certainty of defeat, thereby freeing the Navy for its proper sphere of operations—the enemy's coast line, and the routes of seaborne commerce.
2. To defend India and those Colonies which hostile forces might invade.
3. To defend our bases of operation all over the world, *i.e.*, coaling stations and important ports.
4. Expeditionary purposes.

With regard to No. 1, it may be said that, if we have enough ships, this is not necessary. To this I reply, that no living being can possibly predict that, under all circumstances and in all places, we can ever be certain of even numerical superiority; and that, granting even this, we might possibly be defeated, and thus the way to our coast opened. Moreover, there is always this additional danger: France, with her *inscription maritime*, would probably mobilise quicker than we could, while with the huge Army she keeps on foot she could within twenty-four hours put sufficient men on shipboard to cross the narrow sea, which, if landed, would, with the inefficient state of our land forces, render disaster almost certain. Proper organisation of our Army would enable us absolutely to crush any such attempt, and it cannot be said of any naval defence that this is the case.

In defending India, we have three cases to deal with:—

1. Invasion by the sea.
2. Invasion overland.
3. Internal rebellion.

Plainly, so far as the first is concerned, we have nothing to fear so long as we maintain our sea supremacy. So far as the second is concerned, it is necessary for us to rely on the Army. But I may be told that we must still require a Navy to ensure reinforcements. To which I reply, that unless you are prepared so to organise India that she can act as a base for her own operations, you had better give up the idea of holding her altogether.

If we admit, for the sake of argument, that we want 20,000 or 30,000 more white troops to fight an invader, who is there who will

[1] It must not be assumed that the relative importance of these duties is indicated by their numerical order. The first, for instance, is provided for if the other three are satisfied, *i.e.*, the numbers required for these necessarily provide sufficient for the first purpose.

dare to say that, once war is declared we might safely transmit such a force, which, even without munitions of war, would take twenty to thirty of the largest steamers to transport it by the long sea route round the Cape, for it might not be possible to use the Mediterranean?

In the case of rebellion, uncomplicated by foreign wars, there would, of course, be no difficulty in sending reinforcements; but if we are at war no large reinforcements can be sent, unless we can insure their safe arrival, and for this purpose we must have an unquestioned supremacy at sea.

While we are fighting for this purpose, India and our Colonies must rely on themselves, and hence it follows that they must in peace be so organised as to be able to repel all probable attacks which may take place at the beginning of a war, *i.e.*, we must maintain a military supremacy at these points. This remark applies chiefly to Canada and India; our other possessions are practically safe from anything but raids so long as we maintain the sea. Suppose, for instance, a large German force were to be shipped to the German sphere of influence in Africa. It could have but one object, that object, remembering Copenhagen, we should frustrate on the sea. The third duty of the Army is a comparatively light one; the garrisons of the points alluded to could be small, the fortifications not elaborate. The strength of a nation is not to be found in a multiplication of fortresses, but in the efficiency of its mobile field force.

The last duty of the Army is to carry the war into the enemy's country. This is the very root and essence of defence. No prize-fighter can win a fight by merely warding off blows, and we must possess such a force as will enable us swiftly to retaliate on the aggressor. At the present moment our expeditionary power is a Division, plus some extra details, or the First Army Corps. Neither is sufficient to represent us effectively abroad.

Before dealing with any proposed reforms or alterations, may I say a few words on our existing forces? I wish someone would explain to me why, in the Regular Army, we have 148 battalions of infantry, 31 regiments of cavalry, 108 batteries of field and horse artillery. Are they supposed to represent some of the percentage of the population required for war, or to be the exact number of each arm needed by us for our various requirements? It is perfectly well known that there is no such reason, but that they represent the utmost that years of incessant worrying on the part of the military authorities has been able to wring out of successive Cabinets. Similarly there is no reason to be given for the existence of the present number of Militia and Volunteer battalions and batteries, nor can anyone explain why, in the case of the Volunteers, the chief portion of the artillery corps should be formed in a band of country extending across England, from Lancashire to the East Coast, whereas they are chiefly required in the South. A possible reason is, that at the institution of the Volunteers no one took the trouble to see that the nature of the corps sanctioned had some connection with the requirements of the locality, or else that the authorities themselves did not appreciate the problem.

The same system, or want of system, applies to our Colonial forces. It is impossible to say why we find certain numbers in certain Colonies, but anyone who examines into our military arrangements will be at once struck with the haphazard nature of the organisation. Now, I at once admit that it is impossible to lay down one sealed pattern in accordance with which all the Colonial forces should be raised, but I do think that we may ask for uniform training and armaments. Adverting to the last point, those among us who have watched the movements of the manufacturing departments will at once exclaim that it is impossible. I am perfectly prepared to admit, with regard to the rifle, that after some years of practical trial it has been found necessary to abolish the Metford barrel, because it is unable to withstand the wear and tear of the cordite and hard-cased bullet. Of course, the mistake made was ever to introduce it. Its adoption has only been another example of the costly experiments which are occasionally indulged in in this country. While on this point, I take the opportunity of protesting against arming the Volunteers with the Enfield-Martini. If these troops are ever to be employed at all they will be employed against troops armed with magazine rifles. It would be criminal to send our Volunteers against them with a single loader.[1] I am aware that the Lee bolt is expensive to manufacture—that this, therefore, may be a deterrent. But here again the fault lies in adopting a bolt which is no doubt efficient, but which is needlessly complicated, and which was originally devised to extract a badly-shaped cartridge. Our cartridge is well shaped, and does not require it, and any other form of bolt may be adopted so long as the cartridge is maintained.

No doubt, too, our Colonies would be considerably exercised in the choice of a field gun. In twenty-five years, we have had a 9-pounder, 12-pounder, 13-pounder, 14-pounder, 15-pounder, and 16-pounder. Even in the last "Changes in Warlike Stores" (February, 1896) we find the 15-lb. shell introduced for the 12-pounder gun, although the Secretary of State for War stated some little time ago that the shell would be only 14 lbs., the reason I believe, being that the 15-lb. shell "wobbles"—a captious critic might say like the minds of those engaged in devising the field gun for the British Army. If the heavy 12-pounders cannot be bored up to carry a shell equal to those they would have to deal with in the field, they had better be melted up or sold for old metal. Certainly our batteries should be armed with a weapon better suited to meet the field guns of foreign Powers. A similar fate might be meted out to the 16-pounders, the 20-pounders, and the 40-pounders of the Volunteer position batteries. Imagine the anxiety of the artillery officer in charge of an ammunition column with eighteen types of projectiles to serve out, *i.e.*, three for each of the six varieties of gun with which our Army in England would take the field! I include, of course, the new 50-pounder howitzer. In Germany there are two field guns, the 9-centimetre and the howitzer.

[1] Since my Lecture it has been announced that the Volunteers are to have the Lee-Enfield.

Let me now deal with the numbers we require for the various duties of the Army.

We have in England sufficient infantry battalions to furnish three army-corps, if each territorial regiment has one battalion at home and the King's Royal Rifles and Rifle Brigade two each. As a practical fact, we have sixty-five at home to seventy-six abroad. The numbers might be equalised if the foreign establishments of each battalion were raised by seventy men each. We have sufficient field and horse artillery to give each army-corps 102 guns and sufficient cavalry. The question is, Are these three army-corps sufficient? I think not. It is inconceivable that an enemy would dream of invasion unless he could throw over 100,000 men and follow them up by another force of like amount. Now, behind these three army-corps of some 35,000 men each, we have no organisation whatever, nothing but a collection of battalions of Militia and Volunteers, some of them organised in brigades, but with no field artillery. For it cannot be seriously argued that the Volunteer position batteries, armed with a miscellaneous collection of obsolete weapons, are in any way capable of taking the place of Regular field batteries. Moreover, our second line is absolutely deficient in train services. Only two of our three army-corps have a bridge train. If invaded, the salvation of the country would depend on the mobile field force being strong enough to crush the enemy at once. We have no organisation which would in any way be adequate for the purpose. The case is really even worse than I have put it. For of our three army-corps one at least would have to be left in Ireland, so that we should really only have two available to defend London—the objective of the enemy. We require at least six, while Ireland should have not less than two, or eight in all, *i.e.*, some 280,000 men. Behind these, moreover, it would be necessary to have further reserves to supply losses in the field.

Look at the length of coast-line we have to defend. Our troops cannot be ubiquitous, and they must be sufficiently strong at all important points to ensure crushing the enemy the moment he has landed.

Now, we have a total at home of 531,000, composed as follows:—

Regulars	190,000	(including Reserves)
Militia	108,000	enrolled,
Yeomanry	9,000	who trained in 1895,
Volunteers	224,000	efficient at last returns.

Of the Regulars we should certainly have to deduct 15 per cent. for untrained and unfit men from the troops serving with regiments, and at least 10 per cent. from the Reserves.

This would give us available at home:—

	With the Colours.	Reserves.	Total.
Infantry ..	55,000	53,600	108,600
Cavalry ..	10,000	6,600	16,600
Artillery	10 horse 41 field batteries	—	306 guns
Engineers ..	4,500	2,000	6,500

Even if there were sufficient cadres, which there are not, these would only suffice to furnish four army-corps, and the latter would be deficient in guns, in engineer field companies and other details, and in train services. No one can believe that as at present trained the Militia and Volunteers could be fit to take their place in the field army to meet the trained soldiers of any foreign foe.

It is plain, therefore, that only two alternatives lie open to us: either to train a portion of our Auxiliary forces so that they may be fit for use, or else largely to increase our Regular Army. At one point there is no doubt. The Regular Army must have some considerable increase made to it.

Assuming our field army to consist of eight army-corps, all of Regular troops, and two cavalry divisions, we should require:—

192 Battalions Infantry without the corps battalions,
22 Regiments of Cavalry as a minimum,
132 Batteries of Artillery (96 guns per army-corps),
32 Field Companies Royal Engineers,
8 Pontoon Troops,
4 Telegraph Battalions,
8 Field Parks,

besides ammunition columns and train services.

Supposing the eight army-corps to have each one division formed from Militia, there would still be required, if the Cameron Highlanders were brought up to two battalions, and 71 battalions of the Territorial Regiments were always kept at home, and the whole of them put into the Field Army:—

51 Infantry Battalions,
1 Regiment Cavalry,
81 Batteries of Artillery,
24 Field Companies, R.E.,
6 Pontoon Troops,
3 Telegraph Battalions,
6 Field Parks,

besides ammunition columns and train services.

Even then behind the Field Army the rest of our forces would be without field artillery and the other services which go to make them mobile, and here further additions will be necessary.

Taking the Regular troops only of the above eight army-corps for expeditionary purposes we should have, with the proposed organisation, only 150,000 of all arms—certainly none too many for what we should require of them.

I am not asking for anything enormous, or for what we have not done before. In 1809 we had in arms 400,000 Regular troops abroad in Europe, the Colonies and India, while at home were 400,000 Regulars, Militia, and Volunteers. In 1813 the total had risen to 1,000,000—double our present numbers.

Lord Castlereagh thought that we required for Navy and Marines 150,000; Regular Army and Militia, 350,000; Volunteers, 100,000;

Sedentary Militia, 300,000; trained men, 400,000; a total of 1,300,000. Those liable to service under the Defence Act, 2,000,000; the whole 3,300,000, *i.e.*, one-fourth of the then population. What we could do then with a third of our present numbers and wealth, we can most certainly do now if need be. But you will observe I only ask for a much smaller proportion, although I want it organised in peace-time, and protest against waiting till war breaks out to do so.

This lecture is not intended to deal in detail with questions of organisation, but I feel obliged to draw your attention by these figures to the absolute inadequacy of our present organisation. I cannot help pointing out that if we only adopted the foreign plan of localising our Regular troops, it would much facilitate the training of our Auxiliary forces. For then to them could be attached for additional instruction men of the Militia or Volunteers specially entitled as Reserve men and drawn from the same locality. Moreover, the local feeling which already exists in many regiments would largely be intensified. I know that in the case of two regiments with which I am acquainted the experiment of quartering the regiment at its headquarters has been an unqualified success. It tends to bring home the Army to the hearts of the people, to make them look upon "their regiment" as part of themselves. Were not many of the most distinguished regiments of the Peninsular War strictly local regiments?

Moreover, look how this plan would facilitate mobilisation: all the stores being with their regiment where the Reservists would join. Let me give you a few examples to show what I mean. Take the Princess of Wales' Own (Yorkshire Regiment), depôt Richmond, station the Curragh; the Northamptonshire Regiment, depôt Northampton, station Jersey; Royal Irish Rifles, depôt Belfast, station Brighton.

While on this subject, may I pay a passing tribute to the magnificent audacity of the Clothing Department, which proposes, on mobilisation, to pack up and send off some hundred and eighty thousand packages of clothing and necessaries, and ensure that they will all arrive in time at the depôts and places of mobilisation? If we are to mobilise quickly—and we must do so, unless we keep a standing Army equal to our neighbours—there must be absolute localisation of everything and everybody, so that the troops may be ready to move to the place of concentration in three or four days.[1] In France and Germany the mobilisation period is seven days. We have to remember that France has over 400,000 men under arms in peace, and that in the event of war it would be a blow and a word—not the word before the blow.

Another blot in our present system is the fact that the Yeomanry and Volunteers are not liable for service in Ireland. All our Auxiliaries should be available for service anywhere in the United Kingdom, and the Militia for service in Europe or North Africa. As to the garrisons for fortresses, I believe we have sufficient men. Obviously, every endeavour should be made to provide for these locally by Volunteers.

[1] I understand that in future it is probable this will be done.

Some Volunteer corps, such as that furnished by the men of the Royal Arsenal, Woolwich, are evidently useless. They could not be spared from their own work in war-time. Again, it must be impressed on all that war on any large scale means the simultaneous mobilisation of all the military forces. Unless this be done, the least trained portions could not be got ready for the field. Moreover, the total numbers we have are no more than sufficient, and they, as I have said, want re-arranging—augmenting in some parts, perhaps diminished in others. But until this be done, and all alike are organised and equipped to take the field, our organisation is a sham. Our Army, I fully admit, is better than it ever was, but it is insufficient for the task imposed on it. Decentralise and organise in field units, brigades, divisions, and army-corps. Supposing it cost £20,000,000 to do this—I do not say it must—it would not be a recurring expense, and would form a very cheap insurance on the wealth we have to defend.

I have already dealt with India, I do not think that there we want much increase. I think that with our present organisation we could give a good account of any foe who attempted to invade us overland.

And now I come to the Colonies. I belong to that school which thinks that they have not done what they might fairly be expected to do. The Army Book states, that "what is required is a sufficient garrison to man the coast defences, maintain internal order, and meet the minor land attacks, which alone seem probable." But in the case of Canada, something considerably more might be expected, and until we could come to their aid they must hold their own. Yet Canada with a population of 5,000,000 has only 1,000 in the permanent corps, and only 32,000 partly-trained Militia to back them.

It is doubtless quite right, again to quote the Army Book, that "the conditions of enrolment of these (local) forces should be the subject of ordinances passed by the local legislatures, and be those most suited to the conditions of the colony"; but there can surely be no reason why the military experts of the Mother Country should not point out to our brethren beyond the seas what is really required of them. They are as patriotic as we are, and as desirous of maintaining the Empire as any citizen of these realms; but their patriotism is somewhat unordered and ill-directed. Is it to be wondered at? If we at home have never properly appreciated the character of the problem, how can we expect those who are far removed from those political centres, whence wars usually originate, to do so? Moreover, we must remember that our Colonies have grown up since we were engaged in conflict with a power capable of inflicting damage on them.

I do not forget, however, the gallant efforts of Canada at the beginning of this century. But times have changed, and what sufficed then is insufficient now. And yet, if Canadian preparations are incomplete, the rest of our Colonies are more so. The total military forces raised among a population of some 10,000,000, is 91,000, of whom Canada alone furnishes 32,000 men. This total includes permanent local troops, Militia, Volunteers and armed police, and the training of a considerable

part of these forces leaves a good deal to be desired. Now, what I urge is, that not only should the Colonies be prepared to maintain, when rich enough, the whole of the local defences, but that they should also keep up, in accordance with their abilities, a mobile field force. What they have chiefly to guard against (Canada excepted) is raids; these would be impossible if the military arrangements were adequate. Moreover, they should be prepared to furnish troops—few in number may be, but vastly important, as showing the solidarity of the Empire to aid the Mother Country in war, if needed.

These suggestions postulate three principles:—

1. Careful enquiry into the military requirements and capabilities of all the Colonies.
2. A conference at which these should be laid before Colonial representatives, and the best means of carrying them out discussed.
3. The formation of a permanent War Committee for the Empire, the nucleus of which might be the Defence Committee of the Cabinet, supplemented by delegates from the various Colonies, and certainly including the Commander-in-Chief and two or three other superior officers.

We should endeavour to establish in all the more important Colonies such as Australia, Canada, New Zealand and the Cape, arsenals capable, at any rate, of repairing arms and manufacturing ammunition. I go further, and say that if the proposal to localise the forces in the United Kingdom be adopted, that the troops raised in the Colonies might well be affiliated with our own. Thus Canadian regiments might be associated with one division, Australian with another, and so on.

Lastly, I will say a few words on the necessity for foreign expeditions. This is not the place for politics, but I cannot help feeling that in the history of the last twenty years there have been occasions on which the feebleness of our foreign policy, the hesitancy which we have shown in asserting our rights, the squeezability we have displayed in negotiations with foreign Powers have been largely due to the fact that our rulers have felt that the military strength of the nation—I use the term in its broadest sense—has not been sufficient to allow words being backed with deeds. There is no doubt that in European opinion we are doubtful friends and feeble foes. But if it were known that besides our Navy we possessed an Army of 150,000 capable of being moved at a week's notice, we should stand higher in Continental estimation. Each of the two great camps into which Europe is divided would be eager for our support, and we might preserve the peace of the world indefinitely. But such an object, however noble, is not the sole reason why we want an Army for expeditionary purposes. We want it to lead against any enemy with whom we may be at war, or to aid our allies in a struggle. It is to the combined action of the Navy and Army we must look to teach our foes that we are still the nation we were, and this we cannot do unless we possess military forces proportionate to the tasks imposed on them.

I constantly see put forward the idea that we should have to send reinforcements to the outlying portions of the Empire, at the commencement of a war. The proposition is ridiculous. How should we dare to send large bodies of troops across the seas, until we had actual and undoubted supremacy on the ocean? Outside England we must always be ready for war, Imperial troops must be reinforced by local organisations, and the forces in the United Kingdom must be capable of mobilisation in three or four days.

Minor details, but yet important, are changes in our system which would free our officers from much of the routine they now suffer from. The British officer might be described as a return-making animal. I don't know to a few hundreds how many Army Forms there may be—I believe about 2,000. I am sure that many might be simplified and many abolished. I should like to see a committee go through them all and ruthlessly cut out all not absolutely necessary. The introduction of the Naval system of pay and accounts would be an enormous boon to company officers. I think I hear someone say "Not suited to detachments." Precisely, therefore abolish detachments; they are the curse of the Service and ruin the proper tactical training of the soldier. What useful aim can twenty men in the Isle of Man fulfil? Do away with all extra-regimental employment; have these duties carried out by Reservists. Similarly use these men for many things now done by the serving soldier, and try above all to build up round each regimental headquarters a family of time-expired men and their wives for tailoring, carpentering, barrack repairs, care of the stores and equipment required on mobilisation, and leave the soldier to soldier and nothing else—a vast difference to the existing state of things, but infinitely more practical.

Our railway stock, again, is not suited for military work. To take horses in horse-boxes would double the length of trains required. Our wagons are not suited to move military vehicles or guns. It cannot pass the wit of man to devise stock suitable for both civil and military use. What we need above all is an authoritative declaration, not by civilians, but by military experts, of our wants. This declaration must come straight to the people who are the ultimate judges. I have never yet heard it proposed at any hospital that the lay governors should interfere in the wards or decide whether a patient should be operated on or not, but this is the system—I hardly like to use such a word to describe the process—on which we, shall I say, manage, our defensive Services. The time has come when it must cease.

I do not want to interfere with the present constitutional checks, but I do look for some means by which we may know what, in the opinion of those whose experience makes their opinion worth knowing, are our requirements, and these must be once and for all fixed by definite legislation. Time was when a standing Army was thought to be dangerous to our liberties; the danger now lies in not having one. I cannot see that this need affect in any way the present chain of responsibility.

Much more might be said, and, indeed, the detail arrangements of what is necessary could not be adequately treated in a single lecture.

I have endeavoured to put briefly before you the reasons why an Army is wanted, and still more briefly to suggest how it may be obtained.

Of this I am certain, that we live in times big with the future of the Empire. What this future may be depends on ourselves, and on ourselves alone. Conscious as we are of the rectitude of our policy, we are apt to lay too much stress on the protestations of other nations, or on the treaties which exist between us. We forget that, with some, protestations and treaties alike, are but halting places along the steadfast path of progress which is leading them to their ultimate goal—points of vantage, from which fresh assaults may be made against our policy or our possessions.

Weakness invites aggression, inability to adequately defend our Empire will assuredly not save us from attack. Let it not be said of us that we required a Jena or Sedan to make us recognise what our plain duties are. I cannot, and will not, believe that so terrible a lesson is necessary. Remember that in our case there would be no recovery from defeat. For, if it come, the price we shall have to pay would be the dismemberment of the Empire, the transfer of our trade, the ruin of our race. The once proud position we held among nations would know us no more. The flag we have taken to the four quarters of the world would wave only over ruined manufactories and empty homes, while the diminished population left to inhabit these islands could only lament their departed glories, their position rendered doubly bitter by the reflection, that they, the heirs of a glorious inheritance, had lost their patrimony through their own folly and their own blindness.

The CHAIRMAN: I have now to invite discussion upon the lecture which we have all listened to with so much pleasure. It is a lecture which embraces so many points and so many topics, that I think there can be very few here who would not like to say something upon it.

Sir JOHN C. R. COLOMB, K.C.M.G., M.P., late Captain R.M.A.: This is a very important occasion, and a discussion on a subject which embraces the use and application of both Services I think is opportune. But, my Lord, as a student of Imperial defence I say the title of this lecture strikes me with some degree of comicality. I think I may illustrate it shortly without wasting a word by a parallel illustration, a supposition that the Medical Society of England assembled in solemn conclave to discuss the necessity of drink as well as food for the maintenance of the human being. I cannot conceive the attitude of mind of anyone who would dispute, or could dispute, that we are powerless without an Army, though we may have a powerful Navy, or that military power is not a necessity. Having said that, I am bound to offer, as briefly as I can, one or two criticisms as my contribution to the discussion. It must be borne in mind that in a constitutional country you are governed by public opinion, and the misfortune is that public opinion has a tendency to run in only one groove at a time, and, therefore, we have had our military fever when the Navy has been ignored; and we have had our naval fever when the Army has been ignored; and, above all, we have had our civil fevers when both have been ignored. At present, I think we are showing symptoms of the naval fever, and I rejoice, therefore, that this subject is considered, because I think it will pull down the naval temperature of the country and make it contemplate facts; just as when the military fever raged after 1870, some of us used our best exertions to get the country to use a little common sense and, at all events, not to ignore the Navy entirely. Having said that, I

would just take the synopsis. I see the lecturer, like a good many others, speaks of the Navy as the "first line of defence." I wish to enter my protest against that phrase; it is your only line of defence in a sea empire for the protection of the oceans and seas in the world. There is no other, there can be no other. The Army is the complement of the Navy; it never can be the supplement. Now, following that line, I see the lecturer says that the "supremacy at sea must be fought for at the beginning of war." I again join issue with him, and I say that means contemplating a peril which to those who consider the economic circumstances of this country may well be appalling. My ground, and I submit it to the consideration of those who are going to take part in the discussion, is not that the supremacy at sea must be fought for at the beginning of war, but England's supremacy at sea must be assured before going to war. Looking at it from a purely military point of view, what is the use for one moment of talking of military expeditions over sea if you have not got that supremacy? How can you move a drummer boy, how can you move a military force beyond your shores if you have not yet got that supremacy at sea? Therefore, to give force and effect and reality to your Army as your striking power the first condition is supremacy at sea. But it is because—and this is my point—the British public and the British Empire, thank God, is at last beginning to understand that main principle, that it is necessary to remind the British public throughout the country that, having grasped supremacy at sea, you can strike no blows, you cannot exhaust the Power against you and terminate the war, unless you have an Army capable of doing it. I also wish to observe this: The Press seem to treat this problem as if the question, as raised by this lecture, was one of professional rivalry—a question of Army interests as against Navy interests. I am sure no such impression can be held; the only rivalry I know of is to accept and do the duty, whatever Service men belong to, which the country calls them to do, and to rival one another in the fulness of the discharge of the obligation. Therefore, it is from that broad point I come to pass to another and it is this: I am not going to discuss this, but I cannot help making this observation when you are asked to contemplate what might have happened from a military point of view in 1807, you cannot do so as an abstract question, but you must go back to 1805, because it was the battle of Trafalgar which made the Peninsular and your whole military enterprises possible. There is only one other point I will touch upon. In my humble judgment we have on paper a large number of military units. I agree with the lecturer completely about the want of organisation. I agree with him absolutely in his observations upon the military condition of our Colonies, but I point out this: that as your Lordship has recently stated very plainly, and I think it will take good effect, you cannot look, under the present economic condition of the Colonies and their population, to their furnishing such a thing as an army-corps or any considerable Imperial force for general service; but you can call upon them, and ought to call upon them, to do their share of maintaining that necessary preliminary to military strength, the supremacy of the sea, which is as dear and as necessary to them as to the mother country. The mother country would thus be relieved of a portion of the burden, and, so relieved, if the mother country is sensible, more could be done for the Army. But, my Lord, I care nothing at all for the arguments as to our invasion based upon the military power on the Continent. I see in the synopsis it says that: "The increased strength of foreign Armies must be taken into consideration." Yes, it must; but in what way? The Armies on the Continent may grow as they like, but the real question of invasion is not to be measured by the strength of those Armies, but it is to be measured by their naval force, and by their mercantile marine; and, if the reduction of any possible Continental Armies resulted in the production of a bigger mercantile marine, I should say our danger of invasion was increased. Another point is, that the growth of Continental Armies and the burden of these military forces upon Europe are, I think, contributing to our

safety, and not to our damage. The burden and the weight of these armaments cripple the power of those same countries either to increase their mercantile marine, or to largely increase their naval power. Therefore, I am one of those who think that after all the great and burning question of this minute is not invasion. The longer I live, and the more I study it, the more I am convinced that a great invasion of this country, unless we have absolutely lost supremacy of the sea, is impossible; and I go further and say that, even assuming that we have lost it, that invasion is wholly unnecessary. Such is the economic condition of this country, living as it does entirely and absolutely upon the margin of profit between importing raw material and exporting manufactured material, that if that is checked—checked even by moral effect upon your commerce, extinguishing your margin of profit, it is not necessary to land a single soldier in this country, because you are ruined and destroyed. Therefore, I come back to emphasise that, in my humble judgment, the real military question as regards military reform at this moment is the organisation of the Army to do what the Empire will require in war—that is, to attack and worry the enemy wherever you can get at him by military expeditions. I regret that the public mind is confused; and, I say it with all submission, but I fear that the general tone of the lecture will confuse the public mind, and divert it at this opportune moment from throwing all its military energy and all its military efforts into increasing the striking power of the British Army.

Admiral F. A. CLOSE: I wish to express regret that the lecturer has missed one important point, the burning question of the day, *i.e.*, of what use is the Army of this country if there is no food for the men? We know perfectly well at the outbreak of war there will be a panic on the Corn Exchange, and that the workingman's loaf will go up to 2s. 6d.; and though the military authorities may say that the Government will always be rich enough to buy food for the troops, what is the use of the Army, I ask, if we have 50,000,000 behind them who are starving? We acknowledge that the German Army is one of the most perfect military machines in the world, and they have always on hand six or nine months' food for the Army. Also, Germany is a corn-growing country, and is in touch with Russia, which is a great corn-exporting country. We do not grow any corn, to speak of, and we have no magazines of food whatever. Under those circumstances, I think this is a question which the lecturer should touch upon, because without it I maintain that the Army of this country can be of no avail as a defensive force. As a naval man, of course, I cannot criticise military matters; but, as a naval man, I maintain that in case of war with any Naval Power all the cruisers in the world could not protect the vessels necessary to bring us our enormous food supply, and until you get over that difficulty of food I maintain that this Army of ours which is ready to fight for us is not in a position to do so.

Admiral of the Fleet Sir J. E. COMMERELL, V.C., G.C.B.: I heartily concur in the excellent lecture that we have heard. I entirely agree that because you insist upon having a good Navy, and I hope you will so insist, that therefore we are not to neglect our second line of defence. I believe one means of strengthening the hands of the first line of defence will be the knowledge that they have a heavy backing behind them. The idea has crept up of late years—I do not know why, but I think it is a very erroneous idea—that come what may there is no possibility of England being invaded. Now, sir, that appears to me to be the key of the whole principle; if there is no fear of England being invaded, there is no necessity for having an Army, except for those expeditions which Captain James speaks of. But there are other things which are absolutely necessary for the sustenance of the Navy, viz., that we should have a powerful Army to garrison our ports where the Navy get their supplies of all sorts. Without those supplies, especially of coal, the Navy, however large or magnificent, however powerful the ships may be, will be as naught. It would be the greatest possible advantage for the Navy to feel that when they leave their

coaling ports, when they leave the ports of England, that when they come back again they will find them in the position and state in which they left them; that they shall have ports thoroughly garrisoned, thoroughly looked after, so that after a long cruise, tedious not only to body but far more tedious to mind, they shall be able to recruit and recouperate their wearied minds and bodies in peace and comfort. That you cannot do without a good Army. I believe myself the whole Service through, with the exception of a few, that the Navy desire that the Army should be dealt within a fair and generous spirit. We know perfectly well in the Army it is acknowledged that on account of the insular position of England, in consequence of the geographical position of all her Colonies, it is absolutely necessary to have a Navy as the first line of defence, and the primary object of the Navy must be the defence of our coasts, trade routes, and Colonies; but having done that, I for one must strongly deprecate any question arising of "pull devil pull baker" between the Army and the Navy. United we stand, divided we fall. Let us all feel this. At the present time I think we have an excellent opportunity and chance of seeing that the Navy will be thoroughly looked after. Let us see that that is done, and that our Army is also put into a proper state of efficiency fully able to resist invasion, so that we may be able to meet our enemy in the gate.

Vice-Admiral P. H. Colomb:—I am afraid that we are running very much into naval lines on a military lecture. I am sorry, my Lord, that no military officer has spoken, for, although my brother is a soldier, I must count him also as a sailor. I should like to have heard some military officer on the lecture before I spoke myself, but I wish to devote a few minutes to the fundamental question which lies under the lecturer's paper. I noted a passage early in his lecture in which he says: "The history of our race shows that it is only from the conjoint action of the two branches of our armed strength combined in due proportion that the best results have been obtained." Now, the whole question, as I understand it, put forward in the lecture is, what is the due proportion, not in numbers, but in function, in which these forces should be combined? I do not know of any way in which we can get to the bottom of this question but by such discussions as the lecturer has been good enough to raise amongst us here to-day. We have had many of them in this Institution. I am sure that, as between soldiers and sailors as a consequence, the agreement grows closer and closer every month. I do not know that there is any way of settling it except by open, fair and free discussion, in order that we may each get to understand one another and see what our position really is. My brother took a great deal of the wind out of my sails in speaking of his objections to the title. I wish the lecturer had taken a title that I think he has used before, namely, "The respective functions of the Army and Navy in defence." We could discuss it more clearly on such a title. The title chosen would rather seem to suggest that there is somewhere an authoritative party that would put the Army on one side. I have never met such a party, nor have I met any individual who professed to belong to such a party. But unquestionably there is great difficulty in a clear understanding as to the relative positions of the Army and Navy in defence. It is very like bi-metallism; the difficulty, as Lord Farrer tells us, is the difficulty of establishing the ratio, and that difficulty exists between the Army and the Navy. We have not fixed the defensive ratio yet. I myself in years gone by have been strangely misunderstood. It has been over and over again said that I was one of those who wish, as it were, to put the Army behind the Navy. It has never been so with me, my thought has always been that we wanted 100,000 men—the lecturer put it at 150,000, and I will be quite ready to agree with him,—that we could send anywhere out of this country in six weeks. I have thought that that is the least that we could do. The lecturer falls back on that very misleading expression, speaking of the Navy as a "line of defence." I cannot hear anyone using that expression—and I am sorry my gallant friend who spoke last has used it—without thinking that the user was not fully conversant with all the conditions of the

problem. If you had an island self-sustaining and self-contained, with an Army and a Navy, it would be quite right to speak of that Navy as the "first line of defence," because the island we may suppose could not be got at till the first line had been penetrated, and then might be defended on shore. But if you look at a group of islands with an Army and Navy, the Army distributed in the islands, and the Navy guarding the seas surrounding them, you lose at once the idea of "first line of defence." The enemy is in possession of the waters surrounding it, that group of islands, as a group, is broken up, the communication between them is destroyed, and they cease to be a government as a whole. That is the great difference which you must keep constantly in mind in speaking of "lines of defence." There was a very gallant and a somewhat eccentric admiral who at a City dinner, protesting against the expression the "first line of defence" as applied to the Navy, said the Navy was "the first line of defence, the second line of defence, and the third line of defence." Now to my mind that latter expression is just as misleading as the former. If you apply it again to the single island, and suppose that that island had no Army to defend it, but only a surrounding Navy, if that is broken through by a small force, there is nothing whatever to prevent the conquest of the island within the naval line. If you got a group of islands and had no armies in them, it would be the same thing, each island might be conquered by a small force which broke through the naval line. The defence of the group is consequently a joint business. There is first the Navy to protect the waters surrounding the islands, and to preserve the communications between them, and there must be in every island a garrison large enough to make sure that that island cannot be conquered by any force which might be able to evade the watch of the Navy. The preparation for the attack by the enemy in sufficient force must give the Navy notice in time; but when you have got a sufficient garrison for that purpose you have a complete defence between the Army and the Navy, not that the Army is behind the Navy in any way, but that it is acting with it and beside it. This, of course, limits military defence considerably, and it is that limit which, I think, if we rightly understood it, would enable us to have the satisfactory Army which the lecturer pleads for. Now, differences of opinion will exist upon that question of invasion, but it is for the Army a fundamental one. It is not so for the Navy. The Navy—although there are, as we have noticed just now, differences of opinion—the Navy as a whole is quite clear that being in sufficient strength it makes invasion impossible unless it is carried out by a force small enough to escape the notice of the Navy. But if you keep your Army for defensive purposes down to its minimum, you immediately free yourself to have a large Army for sending abroad at any moment that you require it. Therefore the military defence—the part the military take in defence—though absolutely necessary, is logically a minor part: it is one which the Army need not trouble very much with; it is one on which it may consult the Navy, and adopt the naval view, and if the Navy tells it distinctly and clearly that such and such a position is not likely to be attacked, unless it can be successfully attacked with a certain small body of men, then you need not put more garrisons or more works into that point than is necessary to protect against that minor raid. I agree generally with the lecturer's history, but I think, while we take his history as it stands, and while the naval and military defence must be laid down on the lines I have ventured to put forward, this Empire requires more. We have the great land frontier in Asia, which we recognise and prepare to defend, and which the lecturer thinks we are in a good condition to defend. We have recently been strongly reminded of that tremendous frontier in America, which, I understand him to say, we are not prepared to defend, and which I think we ought to be prepared to defend.

Captain JAMES: Certainly not! I said the existing forces are not adequate to defend it. That is a very different proposition to saying I did not propose to defend it.

Vice-Admiral COLOMB: I thought you said we were not ready—not organised to defend it; and I understand you to say so still.

Captain JAMES: That is no doubt so.

Vice-Admiral COLOMB: Well, we have felt most strongly in this recent crisis that everything might have depended upon the possibility of our putting 100,000 men in Canada in a few weeks. I do not know myself, but I am told that we could not put 30,000 men in Canada in a few weeks, and I say, if it is so, there is the real military problem. But I part, of course, with the lecturer when he comes to define his position. He takes it, he says, that the object of the Army is to render it impossible for an enemy to land in the United Kingdom without the certainty of defeat, and—this is the cream of it—thereby freeing the Navy for its proper sphere of operations, the enemy's coast line, and to attack his seaborne commerce. We constantly hear the expression used of how the Navy is to be "freed" to do something which is not defending. The lecturer seems to have it in his mind—he has confused himself with the use of the term "first line of defence"—he seems to have it in his mind that if there was no Army in this country it would necessarily withdraw the fleet from the enemy's coasts. But it is evident to every naval man, and I should think it must be to everyone in this theatre, that if there was no Army in this country, then all the more reason for the fleet being away watching the enemy's forces, and frustrating their advance upon this country. That "freeing the Navy" is a fallacious idea which has stepped into the lecturer's mind and coloured the greater part of his lecture. I am warned, my Lord, that time goes on, but the fact of the matter is that these fundamental questions must be debated and must be got to the bottom of, or you cannot get the Army into its proper condition. If you determine to have a great Army in this country for the defence of the United Kingdom, then I hold it impossible that you can get an efficient Army to send abroad, such as you might have wanted to send the other day.

Lieut.-Colonel T. MYLES SANDYS, M.P., 3rd Bn. Loyal North Lancashire Regiment: I came here to-day without any fixed intention of speaking, but seeing that no other military officer has got up to take part in the discussion, I venture, as a Member of Parliament who has taken, and takes, great interest in the defence of the country, and as an old soldier, and commanding at the present time a Militia regiment, to offer a few remarks on the lecture we have heard. The lecture, I think, we must all have agreed, is a most admirable one, dealing with a subject which is of overwhelming importance, not only to the Service, but to the nation at large. I take it also that we in this room are thoroughly agreed upon the necessity of there being an efficient Army, capable of undertaking in the field in the face of any enemy duties which may be laid upon it in any war. That I take to be a proposition in which we are all agreed. The lecturer speaks practically in this room to an assemblage of experts. Most of us here do not require to be convinced of the necessity for a sufficient Army, but the nation does require to be convinced of it. Now, the practical point to look at is, how are we to turn meetings of this kind to such effective account as shall cause the nation—the ultimate court of appeal—to bring such pressure to bear upon the Government of the day as shall compel them to concede what is needed for our military necessities? That, I take it, is also a point we are all agreed upon. Some time ago, I said in a debate in the House of Commons, no Government in this country, no matter which side it sits upon, has had the courage to tell the nation its military needs, or to ask Parliament to provide the funds necessary to give us a proper Army. I at the same time said that I did not believe and that I was not aware that up to the present time any standard had been fixed for our military requirements in reference to the object for which our Army is intended. The War Minister at that time said that such a standard for the Army had been fixed. But all I can say is that it is some years ago, and up to the present time I am still unconvinced; and from a statement that the lecturer has made to us to-day, I think we may take it the objects intended to be achieved by

our Army at home and abroad, and the strength necessary for carrying them out up to the time, still remain in the clouds. As the lecturer has said, the length of time devoted to his lecture was not sufficient for him to deal with the whole subject. Far be it from me to inflict any further details upon you to-day; but I will say this, that I thoroughly agree with him when he said that we have no second line of defence. Worse than that, with regard to our Militia, which is the true support of the Army, the commanding officers of the Militia were told by His Royal Highness, who recently laid down the reins as Commander-in-Chief, that in the event of war we must make up our minds to have the Reserve men taken out of the Militia forces to bring the first line up to its fighting standard, though he was very sorry to say so, and he knew we should be sorry to lose them, because it would leave our regiments shorn of their best men; yet we must make up our minds to it, as it was for the benefit of the country. I maintain that this is a faulty system, and that if the Militia is to do its work, which it is only too ready to do, its best men should not be taken away in war-time. One other point I emphasise is this: We have at the present time, as we have been told by the lecturer, at least six different patterns of field-guns in use in this Army. The sooner that number is cut down to two patterns the better, and for that purpose I maintain that we ought to have an Ordnance Committee, composed of experts, responsible not to the War Office, but to Parliament for the efficiency of the ordnance of the country. That is a technical question which has many sides to it, and might, perhaps, be thrashed out with advantage at another lecture of this kind. I feel sure that meetings of the kind held to-day, and lectures such as have been given to us by Captain James, cannot fail to be of advantage to the cause which we all have at heart; and I trust that all those whom I have the honour of addressing will do their utmost individually among their friends, and especially in bringing Members of Parliament to influence the Government to give us the Army we need.

General Sir W. Olpherts, V.C., K.C.B., R.A. (late Bengal): It is some years, my Lord, since I have been in the walls of this Institution, or rather that which represented this Institution not long ago. I think on the last occasion I was present your Lordship was in the chair, and you were kind enough to say you would be very glad on every future occasion when you presided to welcome your old friend and comrade, who is now speaking. I have come here not like the last speaker with a fixed determination not to speak; on the contrary, I came here with a fixed determination to speak, if I could find any fitting occasion for doing so; consequently, I not only listened with great attention to what the lecturer said, but I read through the whole of his lecture. I may say I could not find in it any point that I wish to criticise. I think it is a very moderate exposition of the state of the Army, and puts before you in a very modest way the fact, and no one will deny it, that the Army, although as the lecturer truly said it was never in a better condition, still requires strengthening, if not quite so much as the Navy, yet in proportion to the Navy, at least to bring it up to what is required in this country. Now, I could see nothing in the lecture, as I said, that would provoke me to get on my feet, but then came Sir John Colomb, a Member of Parliament, who spoke in such an authoritative manner, and in such aggressive tones—though I really could not make out whether he was attacking the Army or the Navy—that I was induced to send up my card. Having done so, I was fully re-assured by Sir Edmund Commerell's eloquent and impressive speech. He completely took the wind out of the sails of his predecessor. I have not much exception to take with what Admiral Colomb who addressed you said, only as he took rather more than ten minutes, I trust I may be pardoned if I inadvertently exceed the limited time accorded to each speaker. Now, as to the subject of the lecture, I really do not think there can be two opinions in this meeting—that the Army does require strengthening—and I hope it will have it. The Army is as necessary for the existence of this country, as a great country, as the Navy. Supposing we had no Army at all, and that the Navy were defeated, are we to sit down here in this

country doing nothing? I recollect hearing a little anecdote which, on the last occasion when I spoke before Lord Wolseley, I gave as an illustration of my meaning, and which I think made a favourable impression on the meeting referred to. On the present occasion I will give you another anecdote, or illustration. Some years ago, in the days of the old East India Company, an officer was coming home in one of the P. and O. steamers. He got into discussion with one of the officers of that steamer, and somehow or other he must have rubbed him up the wrong way, for the P. and O. officer turned upon him and said, "Who are you? What are you? You only belong to a company. We are a company the same as you. We have got a Navy the same as you, and all we want is an Army to be as good as you!" That was the sentiment of the P. and O. officer, and I think you will agree with him that he was quite right, that he did want an Army to be as good as the East India Company; and that every nation requires an Army—not only a mere handful of men, but a good honest Army—ready to defend the country, and to attack their enemies where necessary. I wish you success in your efforts to increase the strength of the Army.

Lieut.-General F. W. TRAILL BURROUGHS, C.B.: I think we are all agreed we want an Army, and I think we are all agreed we want a Navy. The difficulty appears to be how to get men, both for the Army and Navy. Conscription we are told is very unpopular, and if one mentions the word conscription we are always told the people in this country will not stand it. The only alternative that occurs to me is, that we must then take a back seat in the affairs of the world. Every other great Power in Europe, and even Japan, has conscription. It is said to be a very unpopular word even if you call it general service. I think something, however, must be done in that line, and I think the best way would be, as the lecturer has told us in his most excellent lecture, that as the Queen has the power to call her subjects to serve in the Army and Navy, that we should have a Naval and Military Militia—say, 200,000 men for the Navy, and 300,000 for the Army—on whom the minister of the day could lay his hands and order them to any part of the world on the shortest notice. Until we have such power we shall never be able to hold our own in the councils of the world. For our orators may make speeches, and Parliament may make laws, but without means of enforcing them decrees are of no avail, and as a nation we are despised and flouted by our neighbours. If the conscripts were enlisted—say, for a year at a time—I would not remove them from their daily occupation. I would leave them all in their homes and utilise the machinery of the Volunteers and Naval Coast Reserves to train them; and for, say, a fortnight yearly, the soldiers should go and join the Army autumn manœuvres, and the naval men should go and serve in the Channel Squadron, and be exercised in the defence of our shores, both classes being paid only on the days they drilled or were embodied. I do not think it would do them any harm, in fact, having commanded a brigade of Artillery Volunteers for seven years, I believe they all enjoyed their work very much, and I do not think it would be unpopular. The conscripts might be engaged for one year at a time, and during that year they ought to be liable in cases of emergency to be sent to any part of the world where their services were required to supplement the efforts of the Regular Army and Navy. Without something of that sort I do not know how we shall get on. For in these days the press-gang can no longer be resorted to to fill our ships. And all who served in the Crimea and Indian Mutiny wars will remember how, on both occasions, it was just touch and go with our Army for want of men. Wars nowadays are declared on small pretext, and on very short warning, and they last but a short time. The last great war in Europe was a seven weeks' war. The next may be a seven days' war, and in that short time, if we are caught unprepared, the ruin of the British Empire may be accomplished. It behoves us, therefore, to be prepared, both by sea and land, and if prepared, the prospects of our being attacked are greatly diminished; whereas, if caught

unprepared and attacked by any great Power, our fate will be that of China when attacked by Japan.

Captain W. H. JAMES, in reply: I do not know that there is very much for me to say in reply to the discussion. I, first of all, would deal with Sir John Colomb, who said that no one disputes the necessity for an Army. My answer to that is, the present state of the Army. It is idle to say that the necessity for an Army is admitted, when you see the present state of our military forces, and know what they really ought to be. The reply to Sir John Colomb is, that the nation at large does not understand the problem, and what we who do understand more or less about it have got to do is to educate the citizens of this country into fully acknowledging what their responsibilities are. Now, I have to deal with two members of the Colomb family to-day: both attack me because I use the words "first line of defence." They form a convenient method of expression, which is not meant to be an exact definition; but I do venture to say that the true solution of the problem we are all considering, which is a conjoint one of the Navy and Army, is not to be found in haggling over words or hair-splitting definitions, but in looking to the real facts we are dealing with. There is a point on which I must also join issue with Sir John Colomb when he said that the naval supremacy must be ensured before the war takes place. How in the name of common sense is that possible? No mere number of ships will give you naval supremacy. If the proposition be true, you have only to send over to France and say, "We have ten more ships than you have—you must not fight." At the beginning of every war that takes place we shall have to *fight* to establish naval supremacy, and the postulate of all subsequent operations is that we win in the fight. Admiral Colomb shakes his head. May I ask how we are going to get naval supremacy without fighting? Of course, I do not expect the Colonies to furnish army-corps, and I do not think there is anything in my lecture which would lead anybody to suppose that I did; but I do say the assistance which was given when Australia sent her men to Suakim was exceedingly valuable. It shows solidarity between the various portions of the Empire, and it shows that our brethren beyond the seas are anxious and eager and glad to take part in any struggle in which the mother country may be involved. Again, Sir John Colomb says, under certain conditions, invasion would not only be impossible, but would be unnecessary. That is a point on which I do not propose to offer an opinion. I think it is a point which cannot be settled by Sir John Colomb or any other Englishman, Irishman, or Scotchman; it is much more likely to be settled by a foreigner. If that poor, ignorant foreigner thought, in the event of our losing our sea supremacy, and not having an efficient Army, that it was desirable to invade this country, I am afraid no theories whatever we might here put forward in peace-time would stop him doing so. I confess I do not quite follow Sir John Colomb's argument about foreign mercantile marines. He rather talked of it as if the mercantile marine abroad was organised like the Army and Navy as part of the taxation of the nation, and I do not see how the use of national funds for maintaining an Army and Navy can keep down the mercantile marine of any country if there be profitable means of employing its ships—*i.e.*, the mercantile navy is a growth due to certain economic conditions. If those economic conditions exist you will have a good mercantile navy, in spite of having the biggest Army and biggest Navy in existence. Take our own case: the conditions are favourable to us, and our mercantile navy is the largest in the world. We have seen the growth of the mercantile navies of foreign Powers, notwithstanding the fact that they expend an enormous sum on the Army and on the Navy. I hope the fear expressed by the gallant Member will not be realised. He is afraid that my lecture may divert the public from the necessity for an Army. If this be the case, all I can say is I must have expressed myself very badly; but I fancy from the audible expression of our feelings that this is not the case. Admiral Close asked me how I proposed to feed the Army—that is a point I am going to leave to the

Navy to settle. I am a free-trader; therefore, it is rather a delicate question to put to me. I certainly do not see any means which are likely to be adopted by which we can grow sufficient bread stuffs in this country, and as long as we do not do so we have certainly got to insure their coming from abroad. I must thank my friend Sir Edmund Commerell for all he said. I think it is most important to get an expression of opinion of the nature that he has favoured us with this afternoon from an admiral of his distinction and long service. Now, I come to my old friend Admiral Colomb, who wishes to know what I meant by conjoint expeditions, and what ought to be the respective parts played by the Navy and Army in them.

I am going to give some instances which, I think, carry strong conviction with them, where the Army was ridiculously incompetent for the purpose. Take those expeditions against the French coast. We burnt Cherbourg—what was the effect of that? Practically nothing. If we had been able to land a large army and do something in France, then the result would have been great. We made two attempts on St. Malo—one successful, the other unsuccessful. I do not see that they produced any particular result on the war. But, mark you, these are successful ones: what about the numerous unsuccessful operations in which we have failed in France? What about the Quiberon expedition, in which we failed, simply because we had no proper military organisation to put there? Whenever we have had these joint small expeditions, in nine cases out of ten they have been made by a ridiculous military force, and have produced no result whatever on the course of the war. I always find on occasions like this, when I venture to talk of this particular subject, we have the good old bogey put up to be knocked down, that there is no party which deprecates the Army. There is no one who does not want an Army. It is a very remarkable fact if this be the case, if there be such an enormous concensus of opinion in favour of an Army, why have we not got one? There must be some reason. I leave that to my friends who say nobody has kept down the Army to answer. I take it that the admiral, of whom Admiral Colomb spoke, who said the Navy was the first line and the second line and the third line, was one of those who did not think much of the Army in the defensive arrangements of the Empire. I have dealt with the question and the use of the words "line of defence," but I venture to say anybody who has read my lecture must admit that, when I spoke of the Navy as the first line of defence, I used it in a very aggressive sense, for I distinctly stated that its sphere of operations was on the enemy's coast, and in raids on his seaborne commerce. I do not rest entirely on the Army for defending this country or the Empire, and I really cannot admit that anything I have said justifies anybody in saying that I do so. I have stated that the enemy's frontier is the sphere of operations of the Navy, and when I say this I venture to think that to enable the Navy to do this, to follow out what Sir Edmund Commerell said, it is necessary to have an Army to free your Navy for the defensive-offensive operations. It is not for me to speak of what I do not know. I am in the same position as you all are, I know nothing that we do not hear from the most public sources; but I venture to say there is one point on which perhaps a little naval organisation might be required, and it is this: While we might with an effort be able to put 70,000 men in line for shipping abroad, I am not at all prepared to admit that all the arrangements by which these troops can be transported are in a forward state of preparation. I do not say, and I do not suppose, the non-existence of an Army would render it necessary to withdraw the Navy from the offensive position, I think it should always hold with regard to the enemy's fleet. It seems to me absurd not to see that the best way of defeating your enemy is to hit him as hard as you can. To do that, we do not want the Navy kept at home to defend the coasts. But I am quite sure that as long as public opinion does not give us an adequate Army, so long will public opinion require, when war breaks out, the hampering of the action of the Navy by keeping a large portion of it on our coasts. I do not believe any Cabinet in

existence would dare, at the present moment, to send its fleets away to do what is their proper and right duty, because it would feel a certain amount of difficulty would arise from the fact that they have not got adequate military forces to free them. I hope Colonel Sandys will do what I think a great many other Members of Parliament ought to do, that is to say, endeavour to put these points before the Members of the Government and enlighten them a little on what is really required. I always think a Cabinet Minister is much in the same position as a barrister. A barrister is nearly always an eloquent man, and is always capable of talking more or less reasonably and well on almost any subject you can give him. So it is with regard to a Cabinet Minister. A Cabinet Minister is an orator of long practice, not always a great orator, but always fairly fluent, and always prepared to talk on any subject; and in nine cases out of ten when you come to technical questions like military and naval, his talk on the subject is equally worth listening to, whatever particular branch he may take up. I am very pleased to see Sir William Olpherts here once more among us. We always know that he is amusing, and also we know that amid the amusement he affords us he always wraps up some good sterling common sense. General Burroughs touched upon a very thorny subject, the question of conscription. We in England, I believe, hold that it is a magnificent thing that every one of our men is a Volunteer: so it is, if you get enough of them; but if our people do not volunteer, you will have to take other very drastic means to raise the Army. But I am not at all prepared to admit that at the present moment we have come to an end of the Volunteer Forces of the nation. I think we have dealt with them on certain old lines, and we have continued in the same groove, but I venture to think if we frankly discuss the situation and determine what is required of us, there is no reason to doubt we should get it by voluntary efforts, and I say so for this reason, I believe the English are the most pugnacious, but least military, nation in existence. They are always wanting to fight somebody. At the bottom of every Englishman's heart lies that sentiment that "those foreigners want their heads punched." That is very fine, but it is not sufficient. We want to organise our resources to put us really in a proper position to maintain the Empire of which we are the custodians.

The CHAIRMAN (Lord Wolseley): I shall not detain you very long, for I have little to say, and I shall confine myself to a few words upon the general subject as it has been laid before us this evening, without venturing upon anything like a full discussion of the subsidiary topics brought before us. I should like in the first place to remark that, as you may well imagine, whilst holding the position I do at present, it would be impossible for me to enter upon any minute examination of the subject Captain James has brought before us. Upon the great national question as to whether we require an Army or not, I think we are all agreed; but upon such questions as those of conscription and of universal service, you may well understand it would be impossible for me to say anything. There have been in the course of the discussion many statements made which were not exactly accurate, and yet I do not feel privileged to specify them. I refer to statements made as to our present power of offence and defence, and as to our military forces generally at this present moment, which would represent us as being in an inferior position to that which we really occupy. Above all things, I think that in a discussion of this nature it is very desirable we should start, as the lecturer started, with a determination to discuss the question under consideration in the best possible good humour. There is no intention that I know of on the part of the lecturer, nor do I know of any on the part of those who have listened to him, to attack either the Army or the Navy. I think it is most desirable we should approach the subject under discussion, feeling that the Army and Navy, as has been so well said by that distinguished Admiral, Sir Edmund Commerell, are sister Services, between whom exist the strongest bonds of union, reliance, and affection. That this is so, I know to be universally accepted in the Army. I am

sure I speak in the name of the Army generally when I say that all thinking soldiers are fully alive to the fact that the Navy must be first considered, that, with all due deference to Admiral Colomb, it is our first line of defence, and that consequentiy, there must be no question of its strength, as compared with any other Navy in the world. Now, the question whether the expressions of "first line of defence," and "second line of defence," are, or are not, accurate, matters very little indeed. But, I think, in denouncing that expression—and it was quite open to anyone to denounce it—due allowance was not made to-day for a fact which occurs to most people when discussing the military and naval power of this country: I mean, that the first object for which our Army and Navy exist is the defence of this United Kingdom of Great Britain and Ireland. All will admit that the first brunt of the battle must fall upon the fleets in the Channel and elsewhere round these coasts. In other words, the first line of defence for these two Islands is undoubtedly the Navy, which is intended to protect us from invasion, and the second is the Army, which, in the event of a great naval disaster—and our past history warns us that such a misfortune must be calculated for—is intended to fight the enemy when he has landed on our shores. One of the greatest national misfortunes we can imagine would be such a defeat of our Navy at sea as would leave the Channel open to the enemy and so allow his land forces to invade this country. We require an Army—we must always have an Army—to meet any such possible contingency. With all due respect to the naval enthusiast who may honestly think that a Navy only is necessary, and feeling as I do the greatest love for and pride in our Navy: believing it to be the finest Navy in the world, and that the glories which surround it exceed those of any other Service, be it the Army or Navy of any other country, I cannot help remembering how unsafe and unstable an element the sea is. I cannot help remembering the disasters which from time to time overtake our greatest ships, even during peace manœuvres, in calm waters. We have seen ships run into one another and sometimes sink one another upon such occasions. Does not history tell us of fleets being almost destroyed by one violent storm? And may we not have the same condition of things again? Surely some disasters may overtake us at sea in the future as they have done in the past. Where is the man who, when going into action with our Army, or with any Army in the world, would be fool enough to say that he knew with absolute certainty that he was going to win, and that there was no risk of defeat? And yet we fight upon a stable element like the earth! The man who would speak in similarly confident terms about any fleet would, to state it mildly, far exceed, I think, what he ought to say. We feel the greatest confidence in our Navy, and do most firmly believe that if any English fleet ever meets any other fleet in battle, we shall win; but to assert that such a result is a certainty would, it appears to me, amount to madness. Therefore, as it is impossible to lay down as a certainty that this Navy of ours is always certain to win, I say we must have—pardon me for using the expression—a second line of defence—that is, the Army on shore. There is a point that has been referred to by Admiral Close which I must not pass by, because it is one which I see frequently dwelt upon in newspapers and by gentlemen who write naval essays in magazines—I mean the question of our food supply in this country. I have no wish to enter into statistics as to whether we have three, four, eight, or nine months' provision always in this country for the mouths to be fed. The average, as far as I remember, is from eight to three months, according to the season of the year; that is, of grain supply. I am not talking of cattle, but the actual amount of flour in the country, as far as I remember, is from eight to three months' supply, three months being the minimum. But I take up the position that it matters very little whether we have three or eight months' supply. I look round these two Islands and I see them indented with harbours on every side, harbours where ships can run in and be unloaded; and knowing how impossible it is for a fleet, even for our fleet, the greatest fleet in the world, to close one

harbour or two harbours, I do not believe that all the fleets in the world could effectually blockade all our coasts or keep foreign ships, especially ships from our cousins on the other side of the Atlantic, who are always looking for the main chance, determined to make money where they can, from running their cargoes of wheat into some of the many harbours which stud our coasts. I think that of all the fallacies which have been palmed off upon us of late, this is the worst, for it is the most misleading. I remember well all the circumstances of the time when, some years ago, a demand arose for a great augmentation of our fleet. And may I say, in parenthesis, that no one took a greater interest in it than I did, and in my humble way I do not think many men worked harder in order to have our fleet increased than I did at that time. But I regretted extremely when I saw some of my naval friends then conjure up this bogey of the food supply for our people as an extra reason why we should build more ships of war. I thought the move unworthy of the great question we were contending for; I thought it unworthy of the cause we advocated, because I knew myself that it was utterly impossible to cut this country off from the supplies of wheat which we require from abroad. I do not mean to say that flour would not be dearer after a great naval disaster, or that wheat would not be more costly if we lost command of the sea, and if the enemy were able to cruise wherever they liked about the Atlantic; but, remember, the coasts of Ireland and England are not places, certainly on the Atlantic side, where ships can coal at sea; and fleets blockading the harbours on the West coast of these Islands would have to go back to their own ports before they could coal again. I think people who know our Western coasts as well as I do will be convinced of that. I would also add that if one lesson was taught us by our early naval manœuvres, it was certainly the fact of how impossible it was to keep ships inside a harbour from coming out, or those outside from getting in. I see my friend, Admiral Colomb, shakes his head, and, as the question of blockade is a naval one, I ought, perhaps, to apologise for having touched upon it. But as regards the food supply, that is not a naval point. It is open to any man to take up a map and look at the harbours round these two Islands, and to see for himself how impossible it would be, even after we had suffered the most serious defeat at sea, for any one fleet, or for all the fleets in the world combined, to keep out the supply of corn we should require for our population. As regards many of the various points dealt with by the lecturer, I feel more at liberty to pitch into him than I may be into others. But I have no intention of doing so, because I listened to his lecture with the greatest interest; and, in the main, I agree with its conclusions, although I do not agree with a number of things he said, evidently with the intention of making his lecture more amusing. I shall pass over what he told us of the shortcomings of the Army Clothing Department. I am sorry to say that his statements did hold good some years ago; they do not hold good at the present moment. They were very amusing, however, and served to enliven his lecture. He also told us a great deal about the Martini-Henry rifle and the bore and bolt of the new magazine arm. He said it was settled upon very hastily; he pointed out the great number of guns of different calibres in use in our Army, and he pictured the unfortunate condition of the man who was to be held responsible for supplying ammunition to those arms and guns when in action. I should agree with him if we were in the position that he referred to. However, I am not prepared to say that we have not more than one bore for our guns. I regret very much that we have several bores, but we are doing the best we can in our small, humble way to rectify the various points he has found fault with. I have now merely to wind up our interesting proceedings to-day by thanking Captain James for having given us a very admirable lecture. Whether we agree with the designation of it or not, we must all agree that he has brought before us, in a very pleasant and agreeable manner, a most interesting topic; and whether you agree with his conclusions or not, you are still, I feel sure, grateful to him for having come here to-day to inform us of them.

ABYSSINIA: A BRIEF SKETCH OF ITS GEOGRAPHY AND HISTORY.

Translated from the Russian of V. Fedoroff by Lieut.-Colonel W. E. GOWAN (Retired, late Bengal Infantry).

"The Officers had no maps of the country, which was quite unknown, and no steps had been taken to provide for any emergencies."
Statement of the Italian General Ellena.

ON the North-East of Africa, between the parallels of 8° and 16° North Latitude, and of 55° and 61° East Longitude, lies Abyssinia (the ancient Habesh)[1]. Her boundaries are as follows:—North, the Eastern Soudan; West, Senaar; South, the country of the Gallas: East, the sandy desert of Samhara which skirts the western coast of the Red Sea.

The political boundaries, and, consequently, the total area of the country, cannot be defined with exactitude because of the ceaseless wars, which, with ever-changing fortune, Abyssinia has carried on with her neighbours: the Gallas, Soudanese, Afaras, and Egyptians. But Abyssinia proper, which is inhabited by the aboriginal Ethiopians, and which includes Tigré, Amhara, and Shoa, has an area equal to about half the size of France.

Abyssinia presents the appearance of an elevated mountain plateau towering like a citadel above the surrounding depressions. Rising gradually in Senaar and the neighbourhood of the great lakes and from the banks of the Blue Nile, this plateau steadily ascends in an easterly direction, until, at last, within the 61st degree of East Longitude it reaches an altitude of 7,000 feet above sea level, from which it overhangs, like a high wall, the sultry plains of Samhara. This plateau is cut up into numerous deep ravines lying between lofty mountain chains which are grouped under three distinct systems. These, in their turn, are divided off into lesser chains like detached islands or prisms that often have no means of communication between them.

The first or southern mountain system of Abyssinia begins at the eastern bend of the Abai or Blue Nile, at the point where that river flows out of Lake Tsana. This chain, under the name of the Talba-Wakha, rises to a height of 3,500 *mètres*, and then bends in a westerly direction. Here it gives rise to the Upper Abai, and then, after a sharp turn northwards, it throws off the high and thickly wooded plateau of Dagossa.

[1] *Habesh* in the Abyssinian language signifies "Mixture," a name supposed to have been given to the country because it is inhabited by so many diverse peoples.

To the south of Lake Tsana is the Chok plateau, and to the north of it, in the north-eastern spurs of Dagossa, rises the principal tributary of the Nile—the Atbara—which receives through its right bank the waters of the Takatssi and of the Mareb. To the east of the Dagossa plateau, in an angle formed by the Takatssi, rises up the highest mountain mass of Northern Ethiopia—the isolated plateau of *Simen*, a name signifying "cold." One of the peaks of this plateau—Ras Dadjan—rises to an altitude almost as great as that of Mont Blanc, viz., 15,092 feet, but the average height of the Simen plateau does not exceed 9,800 feet. To the south-east of Simen and the Takatssi river runs the plateau of Lasta, two peaks of which, the *Abuna* Joseph and Imaraha, reach a height of 13,000 feet. The highlands between the Simen and Dagossa plateaux comprise the bold and rocky plateau of Belessa to the north, and the plateau of Behemeder, covered with rich grazing grounds, to the south. Further east again, the last-named plateau runs into the massive Guna chain, from which rises up the striking peak of Debra-Tabor, or Mount Tabor, whereon lies the military capital of Ethiopia. To the south of the Lasta plateau and of the Guna chain runs a whole series of flat-topped elevations which are bounded by the several sources of the Abai or Blue Nile. Amongst these eminences are the isolated plateaux Kollo, Yedju, Shai, etc. Further south of these again is the lofty tableland of Shoa, which is cut through by the turbid waters of the Havash and its feeders, which lose themselves in the sands of Southern Samhara.

Amidst the depressions formed by this mountain system lies Lake Tsana or Dembea, at a height of 7,000 feet, above sea level. The area of this lake covers 50 square miles. Its depth reaches 600 feet, and there are reasons for the belief that its bed was once the crater of a huge volcano. Through Lake Tsana flows the principal river of Abyssinia, the Abai, or *Bahr-el-Azrek* (the Blue Nile), which after a course from the east round the base of the Talba-Wakha range turns in a north-westerly direction, and at Khartoum joins the *Bahr-el-Abiad*, or White Nile.

The second and central mountain system of Abyssinia rises up between the river Takatssi to the south and the river Mareb to the north. The highest portion of this mountainous region is the plateau of Tigré, which ascends to an altitude of 7,000 feet above sea level. The western portion of the same region is in Shire, a country lying to the north of the Dagossa plateau. This portion is not elevated, indeed it descends gradually towards the west, where it skirts the course of the Mareb river; but the south-eastern portion of the same mountainous country, viz., that between the Takatssi river and the Lasta plateau, falls precipitously towards the east over the low-lying plains of Samhara.

To the north of the Mareb river, rises the third or northern mountain system of Abyssinia. This begins just to the north of the parallel of the Gulf of Massowah, and after running at first close to the sea shore it gradually recedes, and at the same time increases in height as it falls back from the sea coast. In the neighbourhood of the Gulf

of Massowah these mountain systems of Abyssinia form the wild and rocky but forest-clad mass which is known under the name of *Sina*, or Mount Sinai. On the highest summit of these mountains stands the chief town of the Bogos country, which is spread over the forelands of the Ethiopian plateau. The tableland of Abyssinia proper begins to the south of Mounts Bogos and Sina, under the name of the Hamassen plateau in the parallel of Massowah. The average height of this plateau is 6,500 feet. This is the most volcanic portion of Abyssinia, for here detached volcanic cones reach far into the depths of the whole tableland. Towards the west the Hamassen plateau falls somewhat, but towards the east and over all the southern parts of Abyssinia it towers precipitously above the surrounding country. A little to the side of the main masses of the Abyssinian tableland, but in the character of their natural prolongation, trend the low hills of Bazene and Dinka, in a direction north and west until they reach the Egyptian Soudan. The same remark applies also to those mighty mountain chains Enare, Kaffa, and Afar, which, after dipping somewhat towards the south, in the Somali country, cross Harrar, and so reach the sea coast, thus causing Africa to jut out into the famous capes of Guardafui and Ras-Hafun. It is true that the mountains of Kaffa and Enare are not inhabited by Abyssinians proper, but these people are the natural allies of Ethiopia, and are generally reckoned amongst the vassals of the Shoan King.

The entire surface of Abyssinia bears traces of terrible volcanic disturbances, and in every direction there are extinct volcanoes, the craters of which are now for the most part filled with the waters of the extensive lake system of the country.

The chief mountain strata are granite, schist, sandstone, basalt, trachite and igneous rocks. Marble and limestone formations are only met with in the north-eastern portions of the country.

The mineral wealth of Abyssinia is not especially great. Iron and coal are everywhere to be found. Gold too is washed from the sand of the numerous mountain streams, and a good deal is thus obtained in the South. Saltpetre, sulphur, copper and silver are raised in Godjam. Rock-salt too is quarried, but chiefly in the country of the Taltalis, which is not far from the Gulf of Tajura. And almost at every step there bubble up medicinal springs.

A characteristic peculiarity of Abyssinia are the numerous flat-topped hillocks (*ambas*),[1] which have such steep and precipitous approaches that they can only be surmounted with the aid of scaling ladders. These hillocks, therefore, constitute natural forts *(magdalas)*. The majority of the rivers too of Abyssinia have a peculiarity of their own which is dependent on the relief of the country, so that before they finally quit the borders of Abyssinia they describe, in their course, curious spirals.

Separated as it is from the sultry littoral of the Red Sea by a high wall of mountains, reaching to an altitude of 3,000 *mètres*, the well-

[1] Interesting particulars regarding these *ambas*, characteristic of the formidable obstacles which they offer to military operations, will be found in Mr. Theodore Bent's *Sacred City of the Egyptians*.—W. E. G.

watered country of Abyssinia enjoys a genial climate. Indeed it may be said that perpetual spring reigns in many localities. In a climatic sense the natives very justly divide their country into three zones. The localities which lie below an elevation of 4,800 feet above sea level, *i.e.*, the valleys, gorges, and low-lying basins, they call *Kuola* or "the hot countries." These are characterised by an actual heat varying from 20° to 28° Réaumur. In these places the climate is an unhealthy one. At times in the confined and stifling gorges the heat is like that coming out of a red-hot oven, registering as it does from 45° to 50° Réaumur, and from it nowhere can man find shelter. This remark applies to the districts of Kuola-Bogara, Vokhna, Kaura, and others which lie on the western slopes of Dagossa, and also to the valleys of the Takatssi, Mareb, Havash, Abai, Beshilo, Djamma, and other rivers. A peculiar feature of the localities to which the name *Kuola* applies is that, during the hot season of the year, all vegetable growths lose their leaves. And yet the vegetation of the *Kuola* zone strikes everyone with its variety, beauty, and vigour. Herein grow all the plants of the tropics: sugar-cane, the tall maize, cotton, coffee, indigo, aloe, the *Baobab* or *Adansonia Digitata*, which attains to a girth of about 70 feet, tamarind, banana, *balsimana*, sycamore, fig, tamarisk, and every possible kind of acacia, etc.

The second or more elevated zone, which has a temperature varying from 10° to 12° Réaumur, lies at an altitude of from 4,800 to 9,000 feet. It is called *Voina-Dega*, *i.e.*, "the country of the vine." Here it may be truly said that spring reigns during the greater part of the year. This zone is remarkable for the extreme richness of its soil, the greater portion of which is under cultivation, and bears a dense population. To the characteristic vegetation of this zone belong the vine, myrtle, bamboo, and every sort of oil-yielding palm and flowering shrub. Of gramineous plants there are the maize (which gives three crops in the year), wheat and barley. Of fruit-bearing growths there are the pomegranate, orange, lemon, olive, and peach. Then there are raised tobacco, potatoes, onions, carrots, etc. Of vegetables especially peculiar to this zone of Ethiopia are gigantic cacti and euphorbias. Since the greater portion of Abyssinia belongs to this zone, this country could be converted not only into one vast granary, but into an enormous botanical garden, comprising every variety of *flora* as well.

The third zone, which lies above an altitude of 9,000 feet is called *Dega*. It is covered with excellent pasture lands, but up to 12,000 feet above sea level oats, wheat, and barley are found growing. Above this line the region of Alpine *flora* is entered. The mean temperature of the *Dega* zone in the day time varies from 7° to 8° Réaumur. And though the thermometer seldom registers zero, yet occasions have been known in which whole bodies of men have been frozen to death in the *Dega* zone of Abyssinia.

As everywhere else under the tropics there are in Abyssinia two marked seasons of the year, the dry and the rainy. From causes which are dependent on want of uniformity in the physical features of Abyssinia, and on the situation of the country with regard to the ocean and to neighbouring

countries which are rainless, the rainy season in Ethiopia occurs not in the winter, but in the summer months. It is at this season of the year that all the rivers are charged with water, so that communication becomes exceedingly difficult, and not unfrequently small streams are converted into roaring torrents, bearing with them death and destruction. The remarkable inundations of the Nile which permit of the cultivation of Egypt, depend, as is generally known, on the tropical rains that so quickly fill the upper courses of the Blue Nile. As an example of the rapid manner in which the rivers of Abyssinia sometimes rise, let us here adduce the following fact. Once the Negus Theodore, as he was returning from one of his expeditions, pitched his camp in the valley of the river Beshilo. The weather at the time was beautiful, and there was nothing to lead to the expectation of a sudden flood. But all at once thunder resounded miles away in the upper course of the river, and then, most unexpectedly there came down, with a loud noise, which soon changed into a terrible roar, a flood which caused the Beshilo to overflow its banks, and in half-an-hour's time to rise several feet above its normal level. The whole of Theodore's troops turned to fly, but nearly all the crags overhanging the valley were inaccessible. The result was that all the baggage animals, transport train, and more than a thousand men were carried down stream and lost. Such sudden misfortunes are very likely to occur in Abyssinia during the rainy season of the year As a rule, the weather up to 2 p.m. is beautiful; the sky then becomes quickly overcast, one clap of thunder succeeds another, the windows of heaven then seem to be opened, and rain descends in torrents. At 6 p.m. it is again clear, and there then remain scarcely any traces of the flood waters that were rushing madly on a few hours before.

The animal kingdom of Abyssinia is as rich and varied in the number of its specimens as is its vegetable kingdom. Thus, in the low-lying localities of the *Kwola* there are elephants, rhinoceri, zebras, giraffes, gazelles; in the reed-grown rivers sport hippopotami, whilst thousands of birds of all kinds, and countless reptiles and insects go to comprise the enormous variety of Abyssinian living forms. On the Gundel plateau, on the course of the Mareb river, there is a locality of a length and breadth equal to several days' journey which simply swarms with snakes, and it is therefore uninhabited. Within the *Dega* zone, as already defined, there are many wild buffaloes, several sorts of antelope, lynxes, hyenas, wild boars, and jackals. There are still many lions on the mountains of Abyssinia and apes and monkeys of all kinds. Indeed, game in Abyssinia is, from its great variety, such as is to be found in no country in the world.

Of domestic animals, in Shoa, Godjam and Damota they breed horses resembling those of Arab blood; in Lasta mules; in Vokhna splendid donkeys, and in the eastern confines of the country they breed camels for the purpose of maintaining the caravan trade across Samhara. Oxen, goats, and long-fleece sheep are everywhere met with. Of domestic birds the Abyssinians keep fowls, ducks and geese. Although apiculture is very widely diffused over the country, the honey sometimes possesses

injurious properties, especially in those places where the bees suck the flowers of the euphorbia.

This country, so bountifully gifted by nature, is inhabited by a capable and war-like people. What the population amounts to in figures cannot be stated with sufficient accuracy, as is so often the case with a semi-barbarous State, because information on the subject is extremely contradictory. Thus, whilst some explorers have put the population of Abyssinia down at 2½ millions, others have reckoned it at 12 millions; more probably it does not exceed eight millions.

The Abyssinians, in respect of their anthropological type and ethnical peculiarities and customs, belong to the number of races of mixed origin. As a rule, they are distinguishable for their tall stature and splendid physique, and their women are often remarkable for their beauty and shapely figures. The marked peculiarity of Abyssinians is their original style of coiffure. Their hair, which is generally long and slightly curly, is piled up and plaited into numerous tresses or locks, thus forming a very striking arrangement of head-dress. In the north-eastern portion of the country, Abyssinians are nearly all white-skinned people, but further to the south their complexion more and more gives place to black, this difference evidently depending on the admixture of negro blood. The prevailing colour of skin may be put down as copper-coloured. In the same changing aspects too are the types of countenance, language, and ethnographical pecularities of this people. Thus, the inhabitants of North-Eastern Ethiopia have a cast of countenance akin to the Caucasian and Semitic type, whilst the South-Eastern Abyssinians are distinguishable by their projecting negro features. Divided by a line passing from the Western spur of Simen to Magdala, the population of Abyssinia may be grouped in two divisions, sharply contrasting the one with the other in respect of colour of skin, language, character, and customs. Towards the west, the Abyssinians present a type of plain dwellers with their characteristic calmness and sedateness. Towards the east a type of attractive, unsettled, and hot-blooded mountaineers. The people of the latter type speak the Tigré language, which is derived from the ancient *Geyets* (akin to the ancient Arabic), in which all the ecclesiastical books of Abyssinia are written, whilst the Abyssinians of the former type (the dwellers in the plains), speak in the dialect of Amhara. These two ethnographical groups are in every way sharply diverse the one to the other, and they are in a state of constant political rivalry. Although victory lies sometimes on this side, and sometimes on that, yet more often it inclines to the side of the more sedate plain-dwellers. The Abyssinians as a nation are distinguished for their bravery, ability to adapt themselves to circumstances and for their ready wit. They are, however, self-opinionated, boastful, not especially mindful of their plighted word, and given to telling lies. To the Ethiopians proper belong without doubt the tribes of Bogos, who live at Senheit, in Northern Abyssinia. Akin to these again are the Takue, who profess the Christian religion, and the Mensi who have long embraced Islam. Near the latter, and close to the gulf of Massowah, are the nomad Hababi, who are to be found at

Beni-Amer and Shokho. These people are a mixture of Abyssinians, Arabs, and Afaras. All these tribes are playing some part in the present struggle with the Italians. Besides the principal races of the Abyssinian type there are other small tribes which have been grafted into the general mass. The most numerous of these are the Agas, who are, in all probability, descendants of warrior castes that came up out of Egypt to the head waters of the Nile during the reign of the Pharaoh Psameticha. Then there are Fellahin—Jews—who trace their genealogy from some ancient Levite (Jewish high priest). Of the people who have no affinity with the Abyssinians proper, are the numerous tribes of Gallas who live, for the most part, in the southern districts of Abyssinia. These curious people, who have joined themselves here to Semitic races, there to Negro, and there again even to Aryan races, speak however a language of Hamitic origin. In respect of type they resemble Abyssinians, especially those of the Aga tribe. The colour of their skin has all shades from dark cinnamon to reddish, and even swarthy colouring. Their features resemble those of Europeans. Of the principal Galla tribes the Metsha are found at Godjam, the Jagada (Christians) at Behe-Meder, the Vollo (Muhammadans) at Ankobar, the Borena and the Ilmorma (Pagans) on the Abai river. Of the peoples whose country borders on Abyssinia and who are in some sort of blood relationship with the Abyssinians are the numerous tribes of mixed origin, but with a strong admixture of Negro blood, known under the general name of Danakili. These people live in the triangular strip of country between the sea coast, the wall of the Abyssinian plateau, and the course of the Havash river. They are nomads, and are sometimes classed as Afaras, because they live in the Afara country, and somewhat resemble the Afaras in type; but in respect of customs and language they belong to one or other of the dominant races of the Ethiopian plateau and of the headlands of Eastern Africa. They are, in fact, analogous to Somalis, Gallas, and Abyssinians proper. The Danakili are to be found also near to the gulf of Tajura. The Afaras (also called Danakili) are divided into two groups—Asakhians and Adokhians, and these two main groups are again subdivided into smaller clans which are ruled by Sheikhs with the title of *Ras*. Of these clans the most powerful are the Modaiti (who live along the course of the Havash river), the Issasi, the Somalis (who are closely allied to Negroes in all respects, and who also live in the neighbourhood of the Gulf of Tajura), the Hadibursa (who live to the south of the Somalis, and who are famous for their raiding propensities), and lastly the Taltali (who are met with on the road between the Gulf of Tajura and Ankobar. These people are extraordinarily like the inhabitants of Central Abyssinia.

The Abyssinians dress very simply. Most of the men wear trousers only. Shirts are principally worn by the women, but the more well-to-do men add shirts to their other garments merely as a luxury. But the invariable article of dress for every Abyssinian is the *Shamma*, a garment which is something like the ancient toga. The knack of wearing this robe prettily is considered a mark of good breeding. Warriors are similarly dressed, but they add a short woollen cloak or bag, which they

throw over the shoulders. Well-to-do women wear, when outside their houses, trousers which are wide and loose. In order to distinguish themselves from people of other religions, Abyssinian Christians wear round their neck a blue silken cord, to which amulets are fastened. The Danakili love to use also the skins of wild beasts and to adorn their persons with the quills of the porcupine and with the feathers of the ostrich.

The staple food of the Abyssinians consists of wheaten cakes, mixed with rancid milk or butter, fish and meat prepared with vegetables, and copiously seasoned with red pepper. The stories about the Abyssinians eating fresh raw meat and drinking warm blood are, in all probability, idle fables. They certainly do eat the so-called *bronda*, but this is meat which, though raw, is but little distinguishable from the underdone roast beef of the European. According to the testimony of Lejean, the Abyssinians can wrap their *bronda* up in a cambric handkerchief without soiling the latter with a single stain. The poorest classes of the people and also warriors on a campaign are satisfied with a small quantity of grain. This fitness for soldiering makes the Abyssinian army a very mobile one. In the way of beverages the Abyssinians use grape wine, honey, and a sort of bitter beer prepared from burnt barley. Of late, however, the Abyssinians have acquired such a taste for European spirituous liquors that in one of their treaties with the French they stipulated for 2,000 boxes of *absinthe*.

The Danakali, who live on the Red Sea coast, are fish eaters, whilst the nomad Samharas live on the produce of their flocks and herds. The inhabitants of the *Dega* districts live, for the most part, by cattle-breeding and by the pursuit of game, whilst the inhabitants of the *Kuola* are principally vegetarians.

Architecture does not flourish in Abyssinia. The buildings both in the towns and in the villages consist of wattle and dab huts, roofed over with straw or reeds. Such dwelling-houses are confined and dirty. The Afaras of Northern Samhara are, however, extraordinarily clean, and are fond of decking out their abodes with mats of various colours.

The most ancient towns of the country, such as Aksum, Gondar, and Ankobar, have numerous stone buildings, much in the Moorish style of architecture. These are, however, but the relics of the flourishing times, long since passed away, when Ethiopia was in touch with the civilised world. There are also several architectural memorials which bear traces of Egyptian art[1] and which show that they were once the residences of Greeks[2] or other Europeans.[3]

Education in Abyssinia stands on a very low level. Indeed, the only persons who are at all educated are those destined for the priestly calling.

[1] For instance, the ruins near Aksum, where there are two obelisks 60 feet high.

[2] The same ruins, near Aksum, are covered with numerous Greek inscriptions.

[3] There are ruins, too, of palaces at Amhara; of a church at Tigré; of a Jesuit seminary at Adowa; of a bridge at Mahetch, etc.

The system of writing in Abyssinia is very complicated. There are no special signs for vowels, which are expressed by changing the sounds of the preceding or following consonants. Thus, the Abyssinian alphabet consists of more than 200 signs. The Abyssinians have no popular literature. And although songs and rhapsodies are much in vogue in this country they are not transcribed at all. There exists, therefore, only a spiritual literature (chiefly translated from other languages). Besides this there are manuscripts, which have been handed down from the very earliest times, and a code of canonical, civil, and criminal laws, under the title of "Feta-Negusta" or "The Guide-book of Kings." *Savants*, especially divines and historians, should feel indebted to Abyssinia for the preservation of certain books, much revered in ancient churches, but since fallen into disuse and classed as "apocryphal," and therefore not recognised by canonical laws. Amongst the number of such books are "The Gospel of Enoch," "The Apostolic Ordinances," and the complete compilation of Erma. With the low level of education corresponds the weak development of the fine arts. Science, in the real acceptation of the term, does not exist in Abyssinia. The local artists, who adorn the walls of the churches with their *icons*[1] and frescoes, depict something so grotesque as to raise an involuntary smile. The Abyssinians are much more skilled in caligraphy and in the delineation of fantastical initial letters to their manuscripts.

The chief occupations of the Abyssinians are cattle-breeding, agriculture, and the pursuit of game. Sport is carried on principally in the districts of the *Kuola*, agriculture in the *Voina-Dega*, and cattle-breeding in the mountain plateau of the Dega. The Afaras, who live on the shores of the Red Sea, at one time engaged in piracy, but now they live by catching fish. All the household work lies on the women, who, however, enjoy in Abyssinia such a position and such freedom as nowhere obtains for the sex in the whole of Africa.[2]

The pursuit of trade, skill and industry, is not held in respect in Abyssinia, so that great need alone impels an Abyssinian to follow either. Such occupations are entirely in the hands of foreigners, such as Jews, Gallas, and immigrant Arab merchants.

Abyssinian imports and exports are not very great, and the small amount of either is entirely due to the unfavourable political conditions and to the disadvantageous geographical position of the country, and to the fact that a hundredth part of the productive forces of the country have not yet been exploited. The articles of import include arms, gunpowder, steel and glass manufactured goods, antimony, cotton reels, needles, necklaces, rings, glass beads, mirrors, copper, pewter, silken webs, red silk, raw silk, blue silken cord, white and blue cotton webs, velvet, broadcloth, light woollen materials, paper, rice, salt, etc. The articles of

[1] Sacred pictures.

[2] And, perhaps, nowhere in the whole world do women make such bad use of their freedom as in certain parts of Abyssinia, where, according to the testimony of one traveller, "everything has its price, except 'profane love' which offers herself, at every step, for nothing!"

export comprise coffee, honey, wax, gums, musk, *koosso*,[1] vegetable oils spices, hides, elephants' tusks and gold, also mules, horned cattle and horses.

The only money token known in Abyssinia is the Austrian *thaler* (Maria Theresa).[2] But gold, cotton materials, arms, ornaments, and rock-salt all have a market value.

Abyssinia carries on trade relations with the Soudan, Egypt, and Arabia, but the chief trade movement of the country is directed eastwards to the Red Sea littoral. Of the many caravan routes between the sea coast and Abyssinia not much is known except of two, viz.:—of that from Massowah to Adowa, Aksum and Gondar, and of that from Tsulla (Zoula) in Annesley Bay to Senafe, Adigrat, Antalo, Lake Ashanti, Lalibala, and Magdala.[3] There is also another fairly good road from the Gulf of Tajura on the Indian Ocean to Ankobar, *viâ* Magdala and Gondar,[4] but as it is very circuitous it is but little used. In view, too, of the fact that just now almost the whole of the Abyssinian littoral on the Red Sea is blockaded by the Italians, the route from the Gulf of Tajura is the only one by which Abyssinia can be entered. Of this route we will now speak in greater detail. From the Gulf of Tajura (at either end of which are situated the French colonial settlement of Obock, and the English settlement of Tseila (Zeila), the Abyssinian plateau is approached by several roads, but these cannot all be used alike. Thus the direct road from Obock, on the Gulf of Tajura, to the uplands of Shoa, a distance of from 350 to 400 *kilomètres*, lies within the country of several predatory tribes, such as the Modaiti, Taltali, and Afaras. The small town of Aussa, too, which lies midway, is in the centre of a very inhospitable people. The small settlements and villages of the Afaras, which lie on this route, are also very doubtful as halting places. Very wisely, therefore, caravans bound from Shoa to the Gulf of Tajura and back again, make a wide *détour* round such doubtful places, and take the more circuitous route which passes through Tseila (Zeila) and Harrar, thereby adding about 140 miles to the distance which has to be traversed. About half of this circuitous route lies within the territory of the Sultan of Harrar, who is under British influence. This route, however, though much safer than the one first mentioned, is unfortunately not easy to get at, either from the Gulf of Tajura or from Tseila (Zeila) by way of Harrar, since between these two places especially, savage robbers frequently stop and plunder caravans, and people like the Hadibursi and the Issasis care but little for the Sultan of Harrar or for the British or, indeed, for the King of Shoa himself. With regard to the remaining routes from the sea coast into Abyssinia *viâ* Massowah, Assab, and the Gulf of Tajura, they are but little

[1] A vegetable growth which is said to cure *tænia* or tapeworm.—W. E. G.

[2] Now in many parts of Northern Abyssinia the Italian *lira* is known, and in Southern Abyssinia both the franc piece and the Egyptian *piastre* are met with.

[3] This road was made by the English during the Abyssinian Expedition of 1867-68.

[4] The section of this road from the Debra-Tabor Monastery to Magdala was constructed by the Emperor Theodore.

used, because of the scanty water supply and the constant plundering of caravans which used to take place.

The internal trade of Abyssinia is mainly carried on in bazaars and fairs, which are held on stated days in all the more or less considerable towns, such as Gondar, Adowa, and Ankobar.

There is no standing Army in Abyssinia but every man is a warrior, and an excellent warrior, too, since he has learnt to bear arms from his earliest manhood. War in Abyssinia is indeed looked upon as the most desirable occupation or pastime, and therefore a very numerous army can be collected quite easily.[1] Martial ardour amongst the inhabitants of Abyssinia has been called forth by the disturbed state of their past history. Such a warlike spirit and such a capacity for self-defence have, of course, a deep significance; but, on the other hand, where and whenever these qualities have not found a constant, legitimate outlet they have led to those perpetual internal disorders which have long weakened the resources of this beautiful country. The Negus Theodore, who reigned from 1848 to 1868, recognised the disadvantages of such a state of affairs, and he attempted to organise a standing Army; but, on his death, all efforts in this direction fell to the ground.

It will not be without interest if we here adduce some particulars regarding Abyssinian troops, furnished by the French General, Count Bisson, who visited the country in 1863. He thus writes: ". . . . The Abyssinian infantry soldier is armed with a very long curved sword and carries a spear and shield. He resorts to cold steel with the greatest enthusiasm. The light cavalry of Abyssinia is the first in the world in respect of the quality of their horses, dexterity and skill in movement. In the attack the Abyssinian cavalry soldier throws down his horse's bridle, and so frees both his hands. He then, with the aid of his knees and legs alone, causes his horse to perform the most extraordinary leaps and manœuvres. Each man carries a sword and two spears. Hurled to a distance of 15 *mètres* his spear always strikes its object, and the blow is almost always deadly. The spear is used like a dart, although it is 2 *mètres* long. Every mounted man has with him an armour bearer on foot, whose duty it is to throw himself on the foe, sword in hand, regardless of danger, and to then carry back the hurled spears to his mounted comrade. Abyssinian cavalry attacks are made with great impetuosity. To be driven back is held to be a disgrace, which cannot be endured. Artillery can alone check such rushes. The Abyssinian armed forces comprise about 20,000 riflemen, all of whom are mountaineers from Tigré, who fight in extended order. The accuracy of their aim is remarkable, and the courage which they display is cool, fearless, and that which despises opposition. Their armament is good; their muskets are percussion, but their gunpowder is poor, each man making it for himself. The Abyssinians possess no artillery, as this arm does not commend itself to the military spirit of Theodore."

It should be remembered that while all this was written in 1863, now 33 years ago, the characteristics of the Abyssinian warrior have not even

[1] This fact has quite recently been exemplified.—W. E. G.

yet become obsolete. And whilst they have remained it must be added that the armament of the Abyssinians is incomparably better at the present time, since it is reckoned that they now have more than 100,000 breech-loading rifles (taken from Egyptians, Soudanese, and Italians), besides those which they have purchased from abroad. They have now also a very fair pattern of field gun. At this period, too, the Abyssinian has, under altered circumstances, already measured his strength in fighting against the regular troops of one of the European Great Powers, and, as he has come out of the trial with honour to himself, he may be considered a worthy foe of the European soldier. It should here be noted that there are now collected under the standards of the several leaders of Abyssinia not less than 100,000 well-armed warriors.

In a political sense Abyssinia is under a feudal system of government, at the head of which is the Negus, with the high-sounding title of "Negus-Negusta," "King of Kings," or Emperor. Theoretically, the Negus possesses boundless authority, but in actual fact this authority is, to a considerable extent, under the control of his vassals. Politically, Abyssinia is divided into four principal States:—1. Amhara, which is ruled over by the Negus himself. 2. Tigré, at the head of which is a Viceroy or *Ras*. At present this post is held by Ras-Alula, who is also commander-in-chief of all the troops of the Negus. 3. Godjam, the ruler of which is Tekle-Minot; and 4, Shoa, whose king is Menelek.[1] Each of these four political divisions is, however, split up into a mass of vassal States, the heads of which very jealously guard their known rights, and are always striving to assert all possible independence. These endeavours are greatly aided by the conformation of the surface of the country, which is broken up by Nature into separate plateaux.. The several vassals, too, form leagues of greater or less importance, and not infrequently oppose the orders of the Negus himself. Each vassal possesses his own fortress, his own troops, and forms his own alliances. Owing to this the most recent history of Ethiopia is full of occasions of strife between the reigning Negus and his feudatories. This circumstance has, doubtless, had much to do with the cutting off of Abyssinia from the rest of the Christian civilised world. The observer who studied the interior economy and popular life of feudal Abyssinia might, perhaps, succeed in elucidating many of the now dark pages of the history of the middle ages of Europe.

The constitution of Abyssinia bears clear traces of those internal disorders which have torn the country for so many centuries past.

Although the Government of Abyssinia may be said to be despotic, yet there exists a well-defined code of laws which has been ascribed to the Emperor Constantine, and which certainly bears the impress of Byzantine influence. In this code have been incorporated the Laws of Moses and also the Statutes of Justinian. By this code have been legalised the right of a father over the lives of his children, the shedding of blood in feuds, the prohibition against tobacco smoking, etc.

[1] Menelek has since united all these divisions under His own rule.—W. E. G.

As a people who are engaged in agriculture, cattle-breeding, and in the pursuit of game, for all of which open space is needed, the Abyssinians do not like to, and cannot, live in towns. For the same reason there are but few towns in the country, and those that there are have only a very sparse population. The chief settled centre of Abyssinia and the capital of the country lies near to Lake Tsana, in the province or zone of the *Voina-Dega*. In the same locality are to be found the most thickly populated towns of Ethiopia.

The capital of Abyssinia is Gondar (with a population of 10,000). It stands on the river Dembea, which flows into the Northern end of Lake Tsana. From a distance Gondar has quite a European appearance. Its houses are principally of stone, roofed over with reeds. The numerous ruins in its neighbourhood afford cover to leopards and hyenas. Gondar possesses forty churches, and on a mountain near it tower the ruins of a palace, which must at one time have been the grandest structure in the whole of Ethiopia. The Mussulman inhabitants occupy a separate quarter of the town. This quarter was once burnt down by the Emperor Theodore, but it has since been rebuilt. At Gondar, Chelga, and Korata,[1] which lies on the south-eastern shore of Lake Tsana, are centred almost all the wholesale trade of Abyssinia.

The position of the town of Chelga is a peculiarly favourable one, as it stands on the water-parting between the basins of the Blue Nile and of the Atbara. Chelga is, therefore, the centre of Abyssinian merchants whose caravans come laden with the trade of the Soudan, and of Nigritia, and it is the point at which trading dues are levied on all goods entering the country.

Outside the basin of Lake Tsana towns are rarely met with, and those that there are, are situated at some distance from rivers, and usually lie at a considerable altitude. Not far from Lake Tsana stands, on a high mountain, the famous monastery of Debra-Tabor, which attracts large numbers of Abyssinian pilgrims. It was appointed by the Emperor Theodore as the military capital of Abyssinia. Close to it are the ruins of a castle which was the "Versailles" of the reigning Negus of Abyssinia. To the south-west of Debra-Tabor, and not far from it, is another famous monastery called Mahdera-Mariam, which stands on a lofty basalt crag. It is one of the most frequented places of pilgrimage in Abyssinia.

In the basin of the Abai (Blue Nile), in the province of Hodjam, stands the trading town of Mota, on the mountains of Talba-Wakha. Near it is a small village inhabited by descendants of Portuguese, who came here in the 16th century.

The sacred city of Debra-Verk on the Nile is remarkable for its buildings of large size. The Chief of Godjam lives in the town of Moakorer. To the south of Godjam, the town of Basso is famous for its trade. Here congregate Abyssinian and Ilm-Ormo traders, and also merchants from Damota and Kaffâ. To the east of the Abai river and

[1] Korata was not long ago famous for the best wine of Abyssinia, but now the vines have been destroyed by a kind of fungus.

high above the Beshilo valley rises up the famous Magdala crag, on which the unfortunate Negus Theodore killed himself after interning his European captives here for two years. The Magdala crag is one of the most remarkable in the whole of Abyssinia for its inaccessibility and for its almost perpendicular sides. On its flat top are situated the barracks, prisons, storehouses, and vast reservoirs excavated out of the solid rock. On the Simen plateau stands the monastery of Voldebba, one of the most sacred in Ethiopia. To the east of the Takatssi river is situated another of the sanctuaries of Abyssinia, viz.:—Lalibala, which, like Rome, is built on seven hills, and which, like Jerusalem, possesses its own Mount of Olives. The churches of Lalibala, are hewn out of the rock, so that together with its altars and colonnades Lalibala is a veritable city of rock. To the east of Lalibala, on Lake Hanko, stands the village of Mariam, which is inhabited by the wives of the various priests. On the Lasta plateau stands the town of Sokota, which is famous for its trade. At the mart in this town trade negotiations are conducted by means of pieces of rock-salt called *amole*, which are valued at one franc. Not far from Sokota stands Adowa—the capital of Tigré, and the largest mart in Abyssinia after Gondar and Basso. Adowa was at one time the capital of the large empire which stretches from the Nile to Cape Guardafui. Aksua—the second capital of Tigré—is still considered a sacred city, and has the rights of a city of refuge. Near it still stands an Egyptian obelisk, 6·25 *mètres* high. The town of Antalo—one of the prettiest in the whole of Abyssinia—does a large trade in salt, which is quarried in the country of the Taltalis. King John of Ethiopia built for himself the new military capital of Makale on a high rock which commands the country of the Danakili. The several small towns which cluster together in a direction bearing north of the crest of the Abyssinian plateau, and towards Samhara, are visited by caravans on their way to Tsulla (Zoula) and Massowah. On the plateau of Hamassen are met with several subterranean dwelling-places, hewn out of the solid rock. On the road from Tigré to Massowah, at the very edge of the Ethiopian tableland, hangs the small village of Asmar, the capital of the famous Ras-Alula. This village is locally known as the "Queen of the Sea." Further north, in the Bogos country, high up lies the town of Keren, which commands the road leading towards Massowah. Keren was at one time the centre of the Roman Catholic Missions in Abyssinia.

On the descent from the mountains, and facing the sea in the direction of Massowah, stands the village of Saati, which is now famous for the catastrophe which overtook the Italian arms.

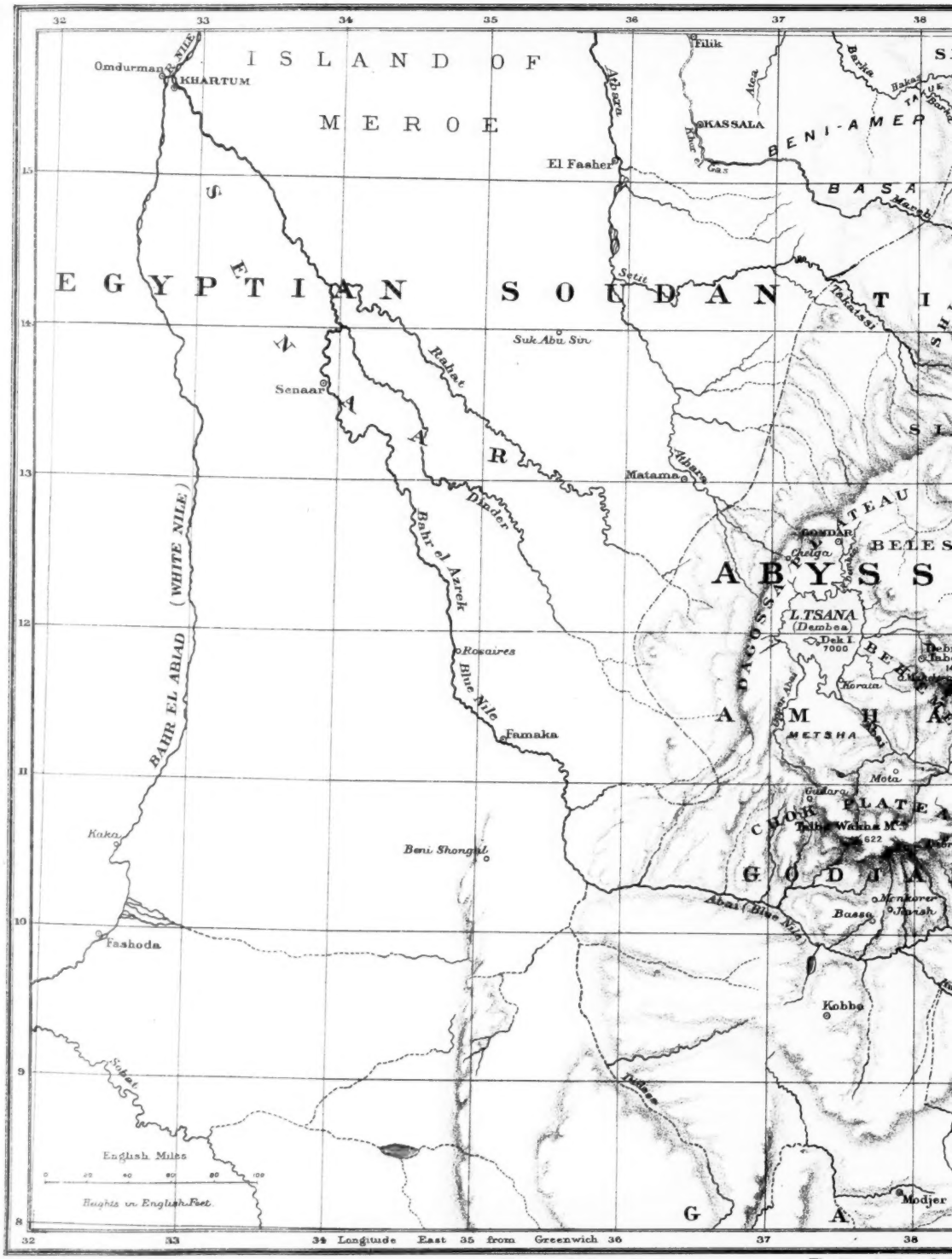
Massowah was seized by the Turks in 1557. It then passed into the possession of a local sheikh, and afterwards went from hand to hand, until at last the Abyssinians, finding themselves cut off from the sea, ceased to pay any special attention to it. Situated on an island, Massowah has long been a trading centre for Abyssinians, Arabs, Egyptians, Greeks and other Europeans. As a support to Massowah stands the port of Tsulla (Zoula) on the shores of the excellent Annesley Bay. This was

the point of debarkation of the English during their celebrated Abyssinian expedition of 1867-68. To the south of Massowah, and within the 13th parallel of North Latitude, is situated the Italian colony of Assab, through which communication is kept up between the valley of Gulima, Tigré, and Samhara. Further south again, and between the 11th and 12th parallels of North Latitude, lies the splendid Gulf of Tajura, at the northern end of which stands the French colony of Obock, and at the southern end the English settlement of Tseila (Zeila). The small point called Tajura lies at the exit of the road from Shoa and across the country of the Danakili towards the sea.

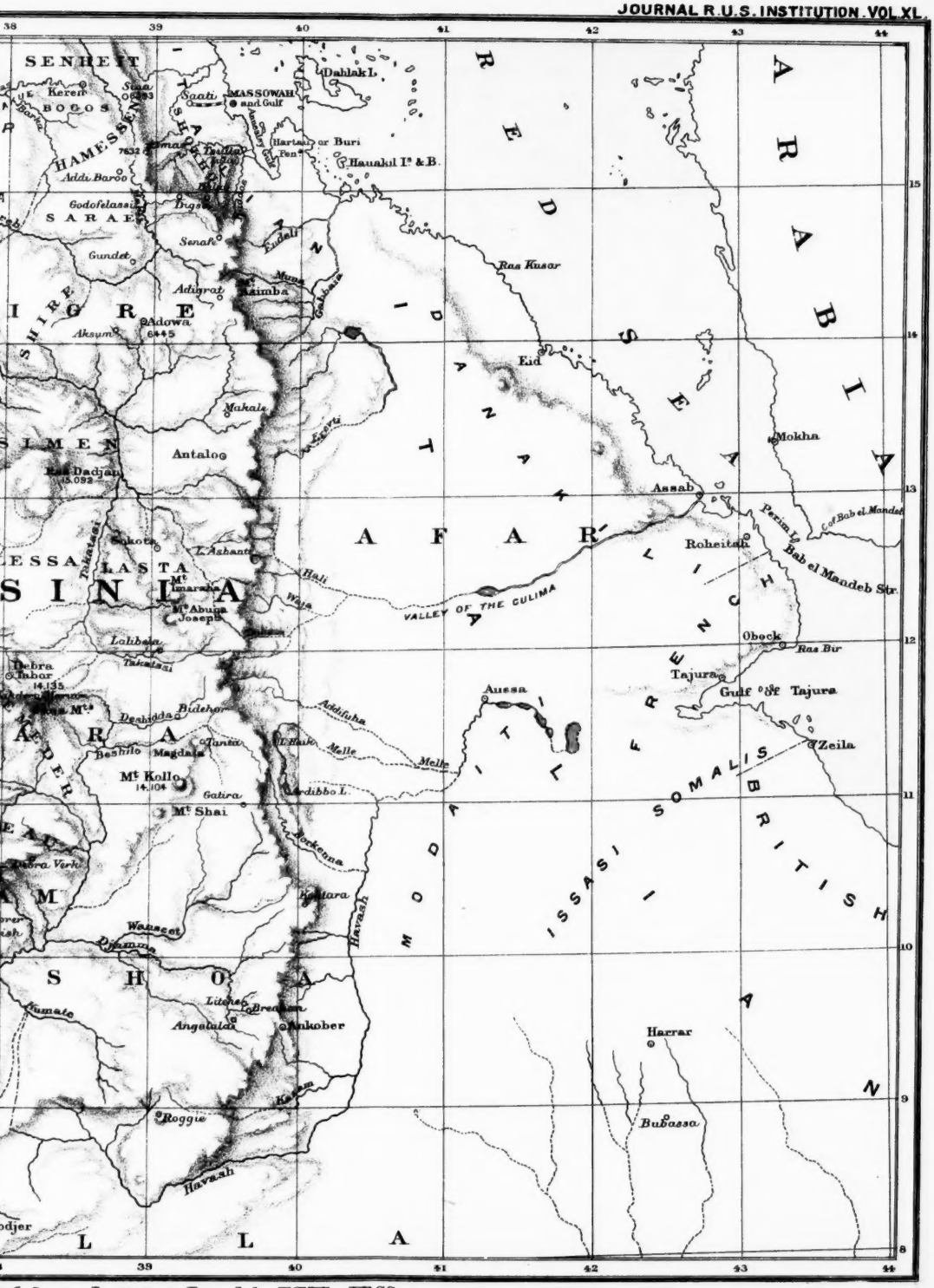
Both slopes of the main chain between the rivers Havash and the Blue Nile lie in the centre of the southern division of Abyssinia, wherein are situated the two important towns of Shoa, viz.: — (1) Litche, Menelek's capital and the principal trading mart of the country; and (2) Ankobar, which is the chief centre of all the caravans approaching from the sea coast. On the road betwken Ankobar and the Gulf of Tajura stands the small town of Aussa in the Danakili country. It was at one time the capital of the Muhammadan kingdom of Adel.

Since 1882, Tajura, Sahalo, and Obock have belonged to the French, who have thus possessed themselves of the shores of this splendid gulf (Tajura) which overlooks Aden, the Straits of Bab-el-Mandeb and the Indian Ocean.

Two or three places mentioned in the article have been omitted in the map, as it was impossible to fix their position with any accuracy; and there is also a slight difference between the Russian spelling of some of the places named in the article and that adopted by English map-makers.—ED.



Prepared from the latest sources for The Royal United S



ted Service Institution's Journal by F.S.Weller F.R.G.S.

THE FRENCH 120mm. FIELD HOWITZER.

By Major F. HOLZNER.

Translated by permission from the "Mittheilungen über Gegenstände des Artillerie- und Genie-Wesens" for the JOURNAL of the Institution, by Mr. F. H. A. Bex.

BY a recent decision of the French Ministry of War, the armament of their Field Artillery is in future to consist mainly of a light Q.F. gun of small calibre,[1] with a flat trajectory; in addition to which field howitzers of heavier metal, and the larger calibre of 120 millimetres are to form part of the equipment of a certain number of regiments. In thus adopting special field howitzers, France has followed the lead of Russia with, however, this difference, that instead of forming separate bodies (regiments), the field howitzer batteries have been joined to existing units.[2]

It is obvious that the 120-millimetre field howitzer forms a very effective connecting link between the ordinary field-gun and the equipment of the French light siege trains discussed in an article which appeared in No. 4 of the *Mittheilungen* for the year 1894.

The construction of the new field gun is at present still veiled in mystery, but recently issued regulations[3] give fairly full particulars of the 120-millimetre field howitzer, especially of its construction, but information is scanty with regard to details of organisation, and as to ballistics, almost entirely wanting.

I.—ORGANISATION.

A 120-millimetre field howitzer battery consists of six guns, nine battery ammunition wagons, one store wagon, one forge wagon, and one forage wagon, with a proportion of supply and baggage vehicles. The complement of draught horses for a battery is made up of six for

[1] According to a statement in No. 114 of the *Militär-Wochenblatt*, dated 28th December, 1895, a 75-millimetre Q.F. gun, carrying a projectile of 6·5 kilogrammes, is to be adopted.

[2] Turkey, Bulgaria, and other Powers have also, as we know, already procured 12-centimetre field howitzers from Krupp.

[3] "Règlement sur le service du canon de 120 court, approuvé par le Ministre de la Guerre le 28 Mai, 1895." Librairie Berger-Levrault et Cie.

Additional sources of information used in this article are the *Militär-Wochenblatt*, No. 12, of February 3rd, 1896; and Girardon's "Organisation du matériel d'Artillerie, 1896."

each gun and battery ammunition wagon (average draught per horse, 349 kilogrammes); the same for the store wagon (average draught, 350 kilogrammes); four each for the forge and forage wagons; two for each of the other vehicles. The six guns with three ammunition wagons, forming three sections of two howitzers and one wagon each, constitute the fighting battery. Each section is commanded by an officer, and each gun by a non-commissioned officer. The issue of ammunition is controlled by a pyrotechnical non-commissioned officer, and three specially detailed corporals have charge of the wagons. The gun detachment consists of six men (four with the gun, two with the ammunition wagon of its section), reinforced, if rendered necessary on account of exceptionally heavy work or during a protracted period of rapid firing, by two additional men from the second-line wagons.

The guns are drawn up in the firing line at 13 metres interval, the three shrapnel ammunition wagons in rear and covering the second, fourth, and sixth guns. When specially ordered, an ammunition wagon containing shell is substituted for the centre shrapnel wagon. The drill of a 120-millimetre howitzer battery is the same as that laid down for the 80 and 90-millimetre field batteries. In a fighting position behind temporary shelter or regular fortifications the interval between howitzers is governed by the nature of such cover. The special training of the troops, who must first have been thoroughly drilled with field guns, is divided into training with the single gun battery drill (both dismounted and mounted, the latter on the parade ground and also in the field), the motions of firing (*tir simulé*), and finally in exercising the lieutenants in the leading of batteries, and the non-commissioned officers in the command of sections.

The battery has at its immediate disposal 288 shrapnel (double-action fuzes) and 240 elongated melinite shell (L/4) with percussion fuzes, equal to eighty-eight rounds per gun, and a corresponding number of cartridges. All the gun limbers and the even numbered ammunition wagons carry shrapnel, while the odd numbered ammunition wagons are filled with shell (sixteen rounds per limber, thirty-two rounds per hind wagon). Shrapnel is intended for use against living targets under cover, the melinite shell being designed for employment against resisting objects. Case shot is not used with field howitzers. When a battery is closely threatened it fires upon the approaching enemy with shrapnel timed to $\frac{1}{10}$-second, the gun being approximately laid horizontally. If, however, the guns are already loaded with shrapnel timed to longer periods, the muzzle is rapidly depressed so as to produce fire effect at about 20 metres in front of the attacking force. Shell already loaded in the guns is, under such conditions, immediately expended on the nearest target. The regulations are silent as to larger organisations, the tables of equipment, etc., referring only to the establishment of a group (corresponding to our former battery division).

An ammunition column for 120-millimetre field howitzers consists of five battery ammunition wagons, one forage wagon, one forge and ten

store wagons. Each column carries 368 shell and 432 rounds of shrapnel distributed as follows :—

Contents of	Shell.	Shrapnel.
First 3 Ammunition Wagons (48 each) ..	144	—
First 4 Store Wagons (56 each)	224	—
Remaining 2 Ammunition Wagons ..	—	96
Remaining 6 Store Wagons .. .	—	336
Total	368	432

The ammunition column also carries 800 cartridges, distributed in the same proportion as shown above for projectiles (forty-eight and fifty-six respectively per wagon), and 1,450 friction tubes, allotted at the rate of 90 and 100 respectively per wagon, besides certain reserve stores and a small quantity of entrenching tools. Its railway shipping plant includes six beams, fifty-one lashing ropes, the component parts of a movable ramp, with planking for railway crossings and bridge flooring. The proportion of columns to each group (division) is as yet unknown. The position of a column during an engagement is indicated in day time by a blue flag, and by a blue lantern at night.

The fire tactics of a battery distinguish between battery or section fire (by guns as ordered), and section or battery salvoes. The rate of firing after ranging is regulated by superior authority, otherwise by circumstances. Generally the distinctions are :—

a. Slow fire, when the battery delivers one shot per minute; section salvoes at intervals of two minutes.

b. When ranging, three shots are fired per minute in battery fire, an interval of 40 seconds being observed between section salvoes.

c. During brisk firing (*feu nourri*), six shots per minute is the rule. Section salvoes in this case following at intervals of 20 seconds.

The number of rounds per minute is ordered by the battery commander.

Besides the above rates, a very rapid fire may under circumstances be ordered by the command, "Rapid Fire—Rounds per Gun," or merely, "Rapid Fire," when the guns are quickly loaded, laid by the tangent scale, and fired, singly or in salvoes, on the command of section leaders, exact attention to deflection being sacrificed to speed.

The laying can be done quickly, as the recoil of the gun carriage is said to be entirely prevented, and the barrel, which alone moves backward and forward, resumes almost exactly its former position with respect to direction.

With regard to the regulations for gun practice and the rules as to ranging, I will refer the reader to a review, which will shortly appear in the *Mittheilungen*, of the new French Regulations[1] for Gun Practice of Field Artillery, which includes field howitzers. In this connection, I will only mention that it is, as a rule, the duty of section commanders to determine in the process of ranging the correct timing of fuzes, the shrapnel fuzes being graduated to seconds, as also the bursting elevation. The battery commander may, however, direct the correction of each shot singly by successive loading of guns, or verify the timing by battery salvoes. The responsibility of section commanders in ranging extends also to deflection. They must, furthermore, by range table, or in its absence by the aid of the sliding scale, give laying directions for each shot to No. 1 of guns, the battery commander merely indicating the nature of the projectile and the distance. The laying instruments not being graduated to distances, naturally augments the difficulties in the conduct of practice.

Regarding the general system of training in batteries equipped with the new gun, the Ministerial Decree of the 21st February, 1895, directs that the training of the young recruits of such batteries in the handling of field guns and howitzers is to proceed concurrently. The same rule to apply also to instructional sections (*pelotons d'instruction*). The men of other batteries in the same regiments are, however, not to receive instruction in the service of howitzers before their second year of service.

This decree justifies the conclusion that certain regiments only (for the present, it is said, only six corps artillery regiments) are to have a proportion of howitzer batteries. This view agrees with a statement by Muller in his well-known work, "Die Entwicklung der Feld-Artillerie," published in 1893, according to which certain French army-corps possess two field howitzer batteries[2] (representing a group or brigade division). There was present, coincidently, a group of two field howitzer batteries with the corps artillery of a body of twenty-two batteries massed at Châlons in 1894, for gun practice.

II.—MATÉRIEL.

A.—The Gun (Figs. 1 to 4).

The body of the 120-millimetre field howitzer consists of the barrel proper, the conductor socket *F*, and the hydro-pneumatic buffer. The former is built up to the core tube *K*, the jacket *M*, which extends back from the centre of the tube and is screwed on, and the breech coil *S* (all made of steel). The breech is closed by a screw, with "Bange" obturator *V*, as in the case of 80 and 90-millimetre field guns, with which we are already familiar).[3]

The breech screw has no safety arrangements against either premature discharge or hang-fire. This, together with the occurrence of

[1] Will be translated and appear in JOURNAL.

[2] According to other sources three batteries.

[3] See *Mittheilungen*, 1881, page 403.

after-flashes, and the necessity of constant supervision of the plastic obturation, counteracts the higher speed in firing which the construction of the gun would otherwise facilitate.

The tube has thirty-six parallel grooves, with a constant angular twist of 8°.

The buffer ring *R* on the fore-end carries on its upper surface the recoil index *Z*, and on its right side the "Broca" sight *B*. The object of the buffer ring, which has a rubber cap *u* on its rear face, is to weaken the shock in case of an abnormal rebound through the conductor socket *F*, and to prevent the further recoil of the barrel. The attention of the gunners is drawn to an abnormal recoil by the bending or breaking of the index *Z* on the nose *N* of the conductor socket. The jacket *M*, which is screwed on to the core tube, slides by means of lateral tongues fitting into corresponding grooves of the bronze conductor socket *F*.

The tangent socket *t* (Fig. 1) with brass lining, and the rest for the tangent case is situated on the right of the breech coil *S*, the bed of the detents on the left, and underneath the carrier ring *T* of the buffer tube, which establishes connection between the barrel and the tube of the hydro-pneumatic buffer.

The bronze conductor socket *F* forms the intermediate connection between the barrel proper and the buffer on the one hand, and the carriage on the other. It envelops the barrel in its middle (Fig. 3), allowing slight room for play, and has on its fore-end a continuation reaching downwards and forming the buffer carrier *G*, into which the pneumatic cylinder *L* of the buffer tube is screwed. There is also connected with it a double shoulder *O*, with holes, through which a bolt is passed when preparing the gun for the march. The screw of the oil hole *a* is on the top.

Other parts requiring mention are: the quadrant bed *E*, and the trunnions and trunnion shoulders *P*, on the left one of which is the bed for the deflection sight. The guide grooves on the inside of the conductor socket *F* have already been mentioned.

The buffer tube (Figs. 3 and 4) consists of an oil and high-pressure air-pump, whose effects counterbalance each other. The forepart forms the bronze air chamber *L*, which is firmly screwed into its carrier *G*, on the conductor socket *F*, and is extended rearwards by a strong tube *R* (Fig. 4), upon which the steel buffer cylinder *B* slides. The rear-end of the buffer tube is closed by the piston *K*, fitted, as is also the cap *D*, with arrangements for re-filling the buffer in the manner shown in the sketch. The tube is perforated in several places close to the piston. The buffer cylinder *B* is firmly attached to the body of the gun-barrel by the carrier ring *T* on the breech coil. A pressure valve *V*, kept in balance by Belleville springs, is placed upon that end of the tube *R* which faces the air chamber *f* (Fig. 4), and in front of it is a movable sliding partition *W*, which separates the front space containing compressed air from the cavities in the rear portion, which are filled with mineral oil (petroleum?).

The buffer tube works in the following manner. The barrel recoils on discharge, sliding through the conductor socket and carrying with

it the buffer cylinder *B*. This has the effect of forcing the liquid round the hollow tube *R* inwards through the holes *O* at the piston. The pressure of the accumulating liquid then opens the valve *V*, and the liquid rushes forward and acts upon the movable partition *W*, which thereby still further compresses the air in its front in *f*. The force thus expended exhausts the power of recoil, until finally the highly-compressed air in *f* is able to again expand to its former condition, and in so doing pushes back the partition *W*. This causes the reflux of the fluid into the buffer tube *R* and through the holes in its base outwards into the hollow of the movable cylinder *B*, the automatic advance of which, accompanied by the gun-barrel above it, is simultaneously effected.

When the buffer is correctly filled and regulated it admits of a maximum recoil of 475 millimetres, which limit is not, however, allowed to be reached in the ordinary course. On attaining a stroke of 450 millimetres, steps must be taken to regulate the buffer. It appears that in spite of all preventive arrangements adopted in the construction, a certain loss of liquid gradually occurs during prolonged use. This decreases the efficiency of the buffer, increasing, on the one hand, the recoil of the barrel through the conductor socket, and resulting, on the other, in failure to bring the barrel back precisely to its original position. Immediately the brass index *Z* (Figs. 1 and 3) on the buffer ring *R* is bent on the nose *N* of the conductor socket *F*, the recoil has exceeded 450 millimetres, and reached the admissible limit for safety. It then becomes necessary to employ the next fire pause in replenishing the supply of liquid, which is done with a special pump, the manometer of which indicates 200 atmospheres. This process—not further touched on here—is carried out in peace-time in the arsenal at Bourges, and in war-time by a specially-trained soldier. It requires from 15 to 20 minutes. The forcing in of liquid is stopped as soon as the manometer indicates a pressure of 110 atmospheres. The re-charging of the buffer becomes necessary, as a rule, after 1,500 shots. An unserviceable buffer is replaced by a spare one (one per battery).

The barrel with breech block, buffer tube, and conductor socket, weighs 690 kilogrammes, the proportion due to the barrel proper being about 550 kilogrammes.

The carriage (Figs. 1 and 2) consists of the lower carriage (the wheel frame), and the upper carriage (the gun bed), which rests upon the former. The trail *a* of the lower carriage is composed of two side pieces of rivetted steel plates which converge rearwards, and are held together by several crossplates. It is fitted with the inverted steel crank axle (Fig. 5) mounting two wheels of special construction, the bracket brake, and other metal parts, as explained by the illustration. By the employment of the crank axle (made of forged and tempered gun steel), it becomes possible to combine a comparatively low carriage with wheels of large diameter.

A broad blade *sch*, resembling a ploughshare, fixed across the bottom of the trail, prevents the running back of the carriage after firing

by burying itself, if the soil is suitable. In gravelly or rocky ground a hole must be dug for the purpose. It is said that, when driving over uneven, cut-up ground, the edge of the blade, which when the gun is limbered up is only 37 centimetres above the ground, is apt to touch the surface and thus cause a check. Besides other defects noted during the artillery mass manœuvres at Châlons, in August, 1894, the spontaneous unlimbering of field howitzer carriages when driving across country was a special cause of complaint.

The traversing plane, with the pivot post on the front upper surface of the lower carriage, forms the bed for the gun-frame. The latter has the shape of a small carriage *b*, and is formed of two steel plate side pieces connected by cross plates and strengthened with angle bars. It rests upon the traversing plane of the lower carriage, and turns in front by the pivot eye, on the pivot post *p* (Fig. 1 bottom), the projecting end of which is closed by a nut. The rollers at the rear of the upper carriage run in the grooves of the guide piece *f* on the lower carriage (Fig. 1, top). The cap squares are attached to the trunnion plates by hinges in front, and are locked by spring bolts in rear.

On the march the upper carriage is secured to the traversing plane *R*, by means of a ring *r* (Fig. 2), on a traverse flap *tr*, which is hinged on to the rear transom *g* of the upper carriage. This ring *r* falls over a pin *pf* on the traversing plane, and is held down by a spring bolt. The barrel is further secured for the march by the joint *l* (Fig. 1), on the upper carriage, being connected with the shoulder *O* of the conductor socket, a spring bolt being passed through the eyes of both.

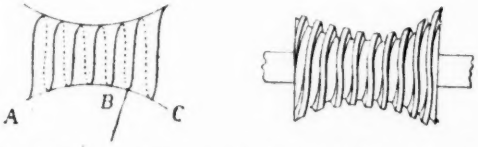
When preparing for action the latter connection, as also that on the lower carriage, is cast off, and the traverse flap *tr*, turned upwards and secured by a spring bolt at 2 (Fig. 2).

While the first lateral direction is roughly effected by shifting the trail, a special traversing arrangement attached to the upper carriage facilitates a more exact lateral adjustment of the latter within a field of 10°, during which operation it turns on the pivot post, already mentioned, of the lower carriage. This traversing gear consists of a horizontal worm *e*, in the rear transom *g* of the upper carriage (Fig. 2), which is provided with a hand-wheel *h* on both sides. The worm gears into a cogwheel *n* (Fig. 6), placed at the back of the traversing plane (of the lower carriage).

The elevating gear is attached to the right cheek of the carriage. It consists (Fig. 1) of an endless screw *oe* revolving in two sockets, which gears with a cog-piece keyed to the right trunnion. The construction of the endless screw, which is explained by the accompanying illustration, admits of several teeth being always in gear, thus preventing broken or missing teeth from interfering with the effective working of the elevating gear.

The aforesaid screw is set in motion by an overlapping double-cone wheel in connection with the lever (with handle and index) *u*. One turn of the lever corresponds to a difference of 4° in elevation. The stationary circular index plate is divided by brass studs into eight

divisions so as to facilitate alterations in elevation by the elevating screw direct. As soon as the desired elevation has been obtained the barrel is held firmly in position by pushing the stopper lever *hh* forward, which causes the nut of the stopper screw to hold the cog *k*. If the lever be reversed, the stopper is released.



As the breech mechanism can only be worked with angles of elevation up to 7°, which very seldom applies to howitzers, the barrel has to be brought back to the loading position after every shot fired, which is inconsistent with the character of a Q.F. gun.

The limits of elevation obtainable by the elevating gear upon level ground, with the blade embedded, are generally +44° and −12°; but, when firing at an elevation of over 40°, or with angles of depression, the wheels must rest upon an elastic bottom—upon sand-bags or fascines, brushwood or similar substances—so as to lessen the shock upon the axle. When firing at angles under 15° and up to 20°, the wheels of the carriage jump, and the carriage may also be caused to shift. With an elevation over 20° this displacement is practically *nil*. Two wheels of a special pattern, with steel tires, are mounted upon the steel axles *as*.

The carriage brake consists of a bracket brake with two arms, worked independently (Fig. 1), each of which is composed of the worm *I*, whose nut is situated in a carrier below the axle *as* and the lever *II*. The brake shafts *III* work the rubber brackets *V* by the right-angled jointed cranks *IV*. An eighth of a turn corresponds to a slight check, not seriously interfering with the draught power of the horses; a three-quarter turn causes a sharp check.

Other parts deserving mention are:—The trail eye, the trail handles for unlimbering and limbering up, the sockets for the traversing handspike (on the left), the hooks and rings for hanging the sponge, rammer and handspike, all on the lower carriage; and, further, the rest for the hand-axe, etc., on the upper carriage. The gun complete, unlimbered, weighs 1,475 kilogrammes, the proportion of the barrel and carriage being 690 and 785 kilogrammes respectively.

The limber (Fig. 7) is in its main features (following the limber hook system) similar to that of existing field guns,[1] but naturally of slightly heavier dimensions. The limber box, however, does not rest directly upon the cross-piece, but upon an intermediate strong frame *r*. The wheels are of the same pattern as the carriage wheels. The flap of the limber box is at the back and opens downwards on hinges, similar to that of the field limber M.77. This arrangement facilitates the withdrawal of projectiles and the preparation of cartridges. The limber

[1] See *Mittheilungen*, 1881, pp. 410 and 411.

has footboards for the gunners riding on both sides, and the back rest is movable between the side supports of the box. The gunners riding at the back are guarded against the danger of falling off by a breast-strap *br* (Fig. 8).

Each limber box contains, in sixteen compartments and four drawers, sixteen projectiles, both parts of sixteen cartridges, and thirty friction tubes. The projectiles are lying free in their compartments, base and head resting on strips of strong buffalo hide, and a cushion of hard rubber tightly encircles them close to the driving band. The point of the projectile fits into a spring counterpoise which keeps the base pressed against a rubber plate on the lid of the compartment. This lid turns on hinges, and is closed by a spring latch, the tongue of which snaps into a catch. In this manner a secure, and at the same time elastic, stowage of the projectiles is effected.

In order to withdraw a projectile, the man, after opening and lowering the flap of the box, unlocks and turns back the lid of the compartment, withdraws the projectile by hand or with the extractor, and then again closes the lid. During action the compartments are emptied in this manner, first the upper then the lower tier.

Each of the centre drawers (Nos. 2 and 3) contains eight cartridges, packed separately and fitting tightly into a square box, and in addition eight open pieces of cartoon, made up in fours, which are intended for use when firing with reduced charges in place of the portions of cartridges withheld. The right of the outer drawers contain thirty friction tubes in packets of ten; further, in separate rests the following spare parts, viz., obturator ring (plastic), breech-head, hand-saw, various screw and fuze keys, lanyard, vent bit, cartridge pricker. The left outer drawer contains one copy of Battery Regulations, one quadrant, M.88, one tangent sight for the 120-millimetre howitzer, one "fixed" quadrant, one deflection scale with two dioptres, one plummet, various spare breech parts, etc., all carefully wrapped in cloths.

When fully packed and equipped the limber weighs 890 kilogrammes, of which ammunition forms 38 per cent., the projectiles alone 36 per cent. Consequently, the fully-packed and equipped howitzer represents a weight of 2,365 kilogrammes, *i.e.*, an average draught of 394 kilogrammes per horse, which exceeds in no trifling degree the limit of weight assigned by artillery experts to a serviceable field-piece.

The equipped and packed Russian 15-centimetre field mortar weighs 2,110 kilogrammes, giving an average draught of 350 kilogrammes per horse (slightly less than our battery ammunition wagon). The weight of the complete Swiss mortar of position is 2,210 kilogrammes, and of the Turkish 12-centimetre field howitzer (Krupp's) 2,100 kilogrammes. (See table at end.)

B.—VEHICLES.

The establishment of a 120-millimetre howitzer battery comprises ammunition, store, forge, forage, provision and baggage wagons. An ammunition column (section) for 120-millimetre batteries consists of ammunition, forage, forge, and store wagons.

The ammunition wagon (Figs. 10 and 11) consists of a limber and hind wagon, the former resembling the gun limber. The hind wagon is attached to the limber on the limber-hook system. Two limber boxes of the pattern already described are fixed upon its frame. The fore part of the joint lid serves as a seat for the gunners; the rear portion is fitted with a rail for the knapsacks of the dismounted men, and a small rack for a forage bag containing 65 kilogrammes of oats. The ammunition wagon is fitted with a bracket brake worked, as explained by Fig. 11, from the rear on the left-hand side. The boxes of the ammunition wagon (Fig. 12)—similar to the gun limber boxes—contain each sixteen projectiles, sixteen cartridges, and thirty friction tubes, which are stored, as already described, in the ammunition compartments and drawers. The left drawer of each first, fourth, and seventh wagon contains, in addition, one fixed quadrant, one deflection laying instrument, one dioptre sight, cleaning rags, etc. All right-hand drawers are packed with one obturator disc, thirty friction tubes, several fuze keys, etc. Various reserve parts, cleaning materials, friction tubes, a candle lantern, M. 91, etc., etc., are stored in the drawers and body of the wagon coffers.

The weight of a complete battery ammunition wagon is 2,360 kilogrammes, corresponding to an average draught of 393 kilogrammes per horse. The battery store wagon (wagon for requisites), M. 1,833, resembles that for field guns, M. 77, described and illustrated in the *Mittheilungen* for 1881 (page 501), but is fitted with suspension springs between the cross-tree of the bed and the hind wagon axle. The brake is similar to that of the ammunition wagon. The contents of the limber box are :—One pump for re-filling the buffer tube, twelve pouches for friction tubes and lanyards, twelve cartridge bags and pricks, five kilogramme-candles (twenty-four candles to a kilogramme), one reserve pane of lantern glass, four kilogrammes grease, etc. The interior of the wagon box is divided by two partitions into three compartments. It will suffice to mention only the principal items of their contents, viz., the battery telescope, M. 86 with stand, one telemeter, one reserve buffer tube, etc., etc. Two reserve wheels, two spare axles, etc., are secured to the outside of the wagon.

The weight of a fully-loaded store wagon is about 2,100 kilogrammes. The spring store wagons, M. 33, of ammunition columns are fitted for the carriage of howitzer ammunition by being provided with lengthened limber boxes, M. 40, and by means of movable partitions in the hind wagon. The forge wagon takes in the various tools and materials for horse shoeing and minor battery repairs (in iron and wood), besides a few reserve parts. It also carries a jack, M. 58, capable of raising 2,000 kilogrammes. It weighs, when fully loaded, 1,834 kilogrammes. The forage wagon serves for various purposes of battery transport, but principally for the carriage of forage, and belongs to the regimental train. Its load must not exceed 1,400 kilogrammes.

Of the various classes of two-horse carriages (*fourgons*), M. 74 or M. 74/79 are intended for the carriage of provisions, one or two spring carts, M. 87, per division, being alloted for officers' baggage, offices, reserve stock of boots, and veterinary supplies. These conveyances are

furnished by the transport department; they are driven from the box, and are provided with waterproof canvas covers. Their maximum load is 900 kilogrammes. One of the provision wagons of each division carries a box containing three lanterns with accessories and spare parts.

The rules for the transport by rail of the *matériel* of the field howitzer batteries are the same as those laid down for the 95-millimetre gun, but only one vehicle (two axles) is loaded upon each truck. If the number of available trucks is limited, some of the ammunition hind wagons are placed together in pairs, and space is found for their limbers with the *fourgons* and sutler's wagons. The trucks must have a minimum floor space of 5·45 millimetres in length, and 2·5 millimetres in width.

Each battery disposes of the following stock of entrenching tools:—

24 Cramps—2 and 1 fastened to each gun and wagon limber respectively, 1 on the store, and 2 on the forage wagon.
9 Spades and 27 shovels—in the proportion of 1 and 3 respectively per ammunition hind wagon.
6 Hand axes—1 to each gun carriage.
6 Felling axes—1 to each first line ammunition wagon.
21 Handspikes—2 and 1 per gun carriage and ammunition wagon respectively.
9 Lanterns, M. 91.
6 Hammers, M. 80, 6 hand-saws, M. 80—1 to each gun limber.
3 Crosscut saws on three of the ammunition wagons.
6 Billhooks in the forage wagons.

Each field howitzer battery also carries with it to the entraining station, distributed over the battery vehicles, four beams, fifty-four lashing ropes, and the component parts of a movable ramp with planking for railway crossings and bridge flooring. These articles are carried along to the detraining station and left there.

III.—Ammunition.

The 120-millimetre howitzer fires shell and shrapnel, M. 91. Besides these patterns of Service ammunition it may also in peace-time use ordinary 120-millimetre shell (in that case filled with melinite) and shrapnel of older pattern, both similar to the projectiles for long 120-millimetre guns, for which a special range table exists, differing from that for Service ammunition.

The older common shell is painted with a black tip; old-pattern shrapnel is similarly distinguished with red paint; modern shrapnel is painted all red, and melinite shell all yellow. The shell is 4 calibres in length, made of steel, and filled with a bursting charge of 6 kilogrammes melinite, which is ignited by the shell fuze inserted in the head. The construction of the pattern of fuze employed, M. 88, Type 22/31 R. (Robin), tends to make it more sensitive with small charges than that used for field gun ammunition. The fuze is screwed into a steel bush at the head of the projectile, which also contains a detonator and delay-action composition in the space below the fuze.

The projectile complete weighs 20·35 kilogrammes.

A description of the above-mentioned fuze not yet having appeared anywhere,[1] a sketch of it is given here. It has the same outer appearance as the field fuze, M. 84, described in Schubert's "Feld-Artillerien."

The body of the fuze *a* (Fig. 13) is closed by the screw *v* at the head, from which the jagged needle *z* projects downwards. There are three holes on the periphery of the screw filled with sporting powder, which is intended to enlarge the flash from the cap. The striker bolt *sb* has a projection, 1—1, 2—2, on each end as a holdback of the safety arrangements. The cap *p* is fixed in its head, and below it rests the charge of sporting powder *g* around the axial quickmatch *x*, a wax plug *w* forming the foundation. Three feathers project inwards from the cover *h*, which is turned over the bolt *sb*, and the mainspring *f* keeps cover and bolt apart. Before discharge, the bolt is kept in position by three feathers projecting from the guard *l*. The spiral spring *d* working in the thread of the bottom screw *bs* of the body of the fuze, and the bolt forms a third means of ensuring safety in transport and during the process of loading. On discharge, the cover *h* moves upon the bolt *sb*, the mainspring *f* becoming compressed, and the three upper feathers sliding over the rounded head of the bolt, and again springing inward under the notch 1—1, cover and bolt now forming one body. The funnel-shaped rim of the cover similarly moves the feathers *l* of the guard *l* aside, and out of gear at 2—2.

When the shell strikes, the feathers and the weak lower spiral spring are broken by the advancing heavy bolt, the cap now being free to fly against the needle, and to effect the explosion of the projectile by igniting the fuze charge.

The intended effect of howitzer shell is the destruction of earthworks against which the melinite shell of the 90-millimetre field-gun is considered to be of too little value. The demolition of an earth parapet 3 metres in thickness, and 2·3 metres high, requires, for instance, ten good hits per metre, with 90-millimetre shell[2], which would result in an enormous expenditure of ammunition against a fortified position. A fair hit with a 120-millimetre shell has the same effect, and it may be asserted that it always equals the effect of any 12 shell of the same calibre, filled with ordinary powder.

Against troops behind thin walls, or cover of similar kind, the shell acts, after penetration of the obstacle, by its scattering *débris*. Under such conditions, the fact of the air pressure produced by the exploding projectile being able to throw down living beings, and to cause them severe internal injuries, is also to be taken into account, together with the destructive agency of splinters. If the explosion occurs in a closed room, after penetration, all the occupants are killed, either by the flying pieces or by atmospheric pressure.

The 120-millimetre (base chamber) shrapnel, M. 91 (Fig. 14),

[1] Except in the "Regulations for the French Siege and Fortress Artillery," Part II. The same fuze also serves for the melinite shell of field guns.

[2] "Leçons d'Artillerie" (page 208), par le Capitaine E. Girardon, 1895.

consists of a steel casing with a groove and copper driving band; the head, which is screwed on, has the double-action field fuze, M. 84, Type 30/38, screwed into its mouth.

A description of this fuze, which is graduated to 22 seconds, is found in Schubert's 'Feld-Artillerien." The timing can be exactly regulated to $\frac{1}{10}$ second by boring the setting spiral according to the time of flight of the projectile. The chamber for the bursting charge at the base of the projectile holds 280 grains of rifle powder F_3. Over the powder a movable disk is placed, on which the bullets are deposited, 630 in number, and weighing 12 grains each.[1] The bullets are embedded in resin and covered with a mixture of wax. A second disk closes the top of the bullet chamber. It would appear that the head remains empty; at least, there is no information to the contrary (the head of Boxer's first shrapnel was, as we know, only filled with wood). But it is also possible that the empty space at the head is fitted with a second bursting charge for percussion action or with a smoke-producing preparation.

The communication tube is screwed into the lower disk; it widens at the top in the shape of a cup, and is closed, after inserting the bursting charge, with a gauze and two paper disks.

The adjusted shrapnel is painted red, and is of the same weight as the shell—20·35 kilogrammes, of which 7·56 kilogrammes (=37 % of the net weight) are taken up by the bullets. By French authorities the angle of the cone of dispersion for Service ammunition is given as 14°. The projectile acts as a case shrapnel, the steel casing, 6 to 10 millimetres thick, remaining intact on explosion.

Against standing obstacles, shrapnel acts by contact shock; against troops, by its bullets and splinters. As a result of experiments the normal height of burst (*hauteur-type*) with charges of 550, 330, and 220 grains, respectively, has been identified at 10, 20, and 30 thousandths, respectively, of the range; at 60 metres, for instance, with medium charge and range of 3,000 metres.

All bursting points of slight elevation are designated as "low," those above the normal as "high," and if more than double the normal height as "very high."

Corrections are made after the following rules:—

The burning time (timing) is increased by

0·8 second	after	2 very high bursts
0·6	"	1 "
		1
0·4	"	2 "
0·2	"	1 "
		1 normal burst

[1] French artillerymen calculate the force required to disable men and horses at 4 and 19 metre-kilogrammes respectively, and require a striking velocity for hard lead bullets weighing 11 grains of 81 and 175 metres respectively, and of 77 and 166 for 15-grain bullets. The bullets of the 80 and 90-millimetre "Obus à mitraille" weigh 15 grains. The above (120 millimetres) shrapnels belong to the class of "Obus à balles" (Wille, "Waffenlehre," 1896).

The timing is decreased by

0·8	second after	2 grazes
0·6	,,	1 ,, and 1 low burst
0·4	,,	2 ,,
0·2	,,	1 ,, 1 normal burst

The cartridges consist of two parts, the normal charge of 550 grains of smokeless powder B.C. composed of two part-cartridges of 330 and 220 grains respectively, which separately form the medium and minimum charge. They are made up in differently coloured and suitably marked bags to facilitate identification. Each part-charge has a layer of 10 grains of gunpowder (Black Powder) C_1 in the bottom of its silk bag to ensure ready ignition of the cartridge. The finished cartridge has the shape of a four-sided prism, whose corners touch the walls of the bore. In closing the breech, the cartridge is slightly compressed lengthwise so that it cannot shift, and retains lateral air space.

When firing with reduced charges, the normal length of the cartridge is obtained by inserting a cylindrically rolled piece of cartoon in the lap of the cartridge bag in place of the portion withheld. This arrangement also makes it impossible to push the cartridge further into the chamber than required for prompt ignition and uniform burning.

In firing with B.C. powder, after-flashes may always be apprehended. This preparation has, like many other kinds of smokeless powder, the peculiarity of flashing after discharge, *i.e.*, a flame frequently shoots forth when the breech is opened immediately after firing. These after-flashes have already caused several accidents. The *Avenir Militaire* reports one case which occurred on the 15th June, 1895, on the range near Poitiers. On that occasion two cartridges and a shell (?) whilst being carried to the gun were exploded by after-flash, four men being wounded by the explosion.

The ignition of the cartridge is effected by the friction tube, M. 85, which is inserted into the vent bolt in the centre of the breech block.

The complement of ammunition of a battery is as follows:—

Carried in	Shell.	Shrapnel.
6 Gun Limbers (16 rounds each)	—	96
4 even-numbered Ammunition Wagons (48 rounds each)	—	192
5 odd-numbered Ammunition Wagons (48 rounds each)	240	—
Total	240	288
Total per Gun in the Battery	40	48
	88	

IV.—Laying Instruments.

Each 120-millimetre howitzer is equipped for indirect laying with a quadrant, a "fixed" quadrant (*niveau fixe*), a plummet, and a deflection sight (with dioptre), all packed away in the gun limber box. A tangent sight, in connection with the "Broca" sight on the buffer ring *R*, close to the muzzle, serves for direct laying. Three fixed quadrants and deflection sights are kept in reserve in ammunition wagons Nos. 1, 4, and 7, making nine of each per battery.

The quadrant, M. 88, was described in an article on French Fortress Artillery (*Mittheilungen*, 1895, page 296). It is used only when a fixed quadrant is not available.

The fixed quadrant (without Nonius) (Fig. 15) is so named because it remains during practice on the stationary conductor socket. It consists of the bronze case *a* with two feet *f*, within which there are two circular plates on a common axle, but movable independently. The latter are pressed together by a spiral spring *p*, and have on their inner side 72 teeth, so that their relative positions can be altered by multiples of 5°. One of these two plates serves as turning wheel *d*, and can be moved within angles of 10° by means of the worm *s*, which gears into the cog piece *o*, and receives its rotation from the stud *k*. The other wheel, the regulator *st*, has to follow the above turning movement by reason of the gearing. The level *l*, with furrowed ends *n*, is connected with the wheel by a pin passing through the quadrant case. By slightly drawing the level outwards, and with it the wheel, the latter comes out of gear with the turning wheel, and can then be freely moved independently. Upon relaxing the pressure both wheels are again put in gear by the action of the spring *p*. An index *x* (with a line scratched on it) projects upwards from the level box. A graduation from 0 to 60°, along which the abovementioned index glides, is engraved on the mantle *g* of the upper sector of the quadrant case. The upper surface of the circular setting stud *k*, again, bears a division of minutes, which is wound past the line *i*, cut in the quadrant case. A watch spring *u* on the inside of the turning wheel causes the constant gearing of the cog piece *o* with the worm *s*, and the spiral spring *r* ensures similarly the movement of the worm in its sockets.

In setting the fixed quadrant, the box of the level is partly drawn out clear of the quadrant case with the thumb and fore-finger of the right hand in the manner before described, and moved until the index line coincides with the 5° line, nearest to that required. The regulating wheel is then allowed to spring back, and comes again into gear with the turning wheel, as already explained. The latter is then turned by means of the stud *k* until the index line coincides with the desired figure on the graduated scale. The turning of the stud is then continued until the given number of minutes coincides with the minute index *i*. For instance, to set the quadrant to 28° 8′, one first sets to 25°, then turns 3° further, and finally adjusts to the 8′.

One advantage of the French quadrant to modern guns of precision equipped with it is that the setting of a Nonius and the calculation of minute multiples are done away with, as the instrument can be accurately

set to a minute. This superiority is also possessed by our own laying instrument. Another advantage is that the fixed quadrant remains on the conductor socket throughout the whole duration of firing, being placed into its bed before commencing practice, and held in position by a locking pin. Corrections during ranging are made without shifting the quadrant, as alterations in elevation are nearly always made by its means.

This may, however, in exceptional cases, be done by means of the elevating gear or the tangent, when the following ratios apply :—

Relative Ratios.

Turns of the Lever of the Elevating Gear.	An Angle of	Tangent Elevation in mm.
$\frac{1}{8}$ turn equals	30′	13
$\frac{1}{4}$,, ,, ...	1°	25
$\frac{1}{2}$,, ,, ...	2°	51
1 ,, ,, ...	4°	102

The deflection sight (Fig. 16) consists of the apparatus proper, and the dioptre scale. The former is composed of a base plate *g*, and the setting bracket *p*. The base plate is pushed into its bed on the left trunnion of the conductor socket, and is firmly held by a pin snapping into a catch, and a clip. The setting bracket turns on the hinge *s*, by which it is attached to the base plate, and the axis of which runs parallel to the axis of the bore. A spiral spring *f* presses the setting bracket away from the base. The movement of the former is effected by means of the milled-headed button *k*, which acts as a nut to the screw *b* jointed to the base plate.

The movable bronze block *o* is joined to the setting bracket by the pin *z*, and its turning power is arrested by the butterfly nut *u*. The block contains the bed *a* for the dioptre scale, and the box level *i* standing perpendicularly on its surface. The bubble of the level is adjusted by means of the screw *b*, *i.e.*, by turning the button *k*. By the use of the level, it is possible to counteract the effects of the wheels not being on the same level.

The steel dioptre scale *d* has an objective, consisting of a turn-down frame *r* with a vertical thread, and an ocular *v* with an eye-hole and a notch above it, which resembles the cross-arm of a tangent scale, and is held fast at the desired deflection point by a clamp *c*. The sight line of the dioptre scale when at zero is 320 millimetres long, *i.e.*, nearly one quarter of that of the tangent scale. The dividing lines on the cross-arm are 0·4 millimetre apart on the dioptre to 1·0 millimetre on the tangent scale, thus corresponding to $\frac{1}{800}$ and $\frac{1}{1360}$ of the respective lengths of sight line. Those on the dioptre cross-arm

reach from – 30 to + 80. Consequently, a correction by one dividing line on the dioptre corresponds practically, with sufficient exactness, to 1·5 millimetre (1·7 exactly) on the cross-arm of the tangent scale. When the dioptre cross-arm is at zero, the plane of sight is parallel to the symmetric plane of the bore. For each correction in deflection, the plane of sight, which remains vertical, forms, with the symmetric plane, the angle corresponding to such correction. The block remains in its first position so long as no considerable change is made in the elevation.

When more extensive corrections have to be made, such as are necessitated, for instance, by the wheels being on a steep slope, and the traversing plane much inclined, special precautions have to be taken with the apparatus on account of its sensitiveness. To use the deflection sight the clamp *e* is slackened, and the eyepiece *v* on the dioptre cross-arm shifted to the dividing line indicated, when the clamp is again tightened. The block *o* is placed in a constant position, so that the selected point, or the auxiliary point, is visible by both the ocular and the objective frame. The bubble of the level, *i.e.*, the effects of the wheels not being on the same level, must be compensated for. The auxiliary mark for the subsequent laying operations may be either in front or in rear of the gun. In the absence of marks in the ground, a pole, planted at least 500 metres distant, is made to serve the purpose. After completing the side-laying the dioptre rule is removed, the block remaining on the conductor socket.

When the laying is effected with the quadrant and the deflection sight, the elevation is taken first, then the exact deflection, and, finally, the fine elevation. For this purpose three men are required.

Any errors in deflection noticed during practice are corrected by shifting the eye-piece on the cross-arms towards the side to which it is desired to direct the projectile. Allowance is also made for wind crossing the range. When firing, for instance, at a range of 1,000 metres, the eye-piece is moved one, two, or three dividing lines further towards the side from which the wind is blowing, according to whether the force of the wind is light, medium, or strong.

One advantage of the deflection sight is that it possesses a shorter sight line, and commands a larger horizontal field of view than the tangent sight. It can, furthermore, be used with any elevation, and even during the process of loading, on account of its being situated at the side, and clear of the breech block.

The stem of the field howitzer tangent sight is similar to that of the field-guns, M. 77, and consists of a three-sided brass tube, which has on its left side a millimetre graduation up to 320 millimetres. The lower part of the cross-arm is toothed, and its motion sideways is effected by a small wheel (with stud attached) gearing into it. It is held fast by a clamp. The millimetre graduation on the cross-arm extends to 50 millimetres to the right, and 20 to the left.

The tangent scale is worked and fastened, when at the elevation ordered, by the setting screw. The case rests with its base plate on a rest at the breech coil, and a spring at the back of it prevents it from

accidentally sliding out. For rapid firing the use of the tangent sight, so far as its graduation allows, is obligatory. On account of the inaccuracy of the plummet, it is only to be used in the absence of any other laying implement.

V.—Ballistic Data.

In the absence of authentic French range tables for the field howitzer, the following ballistic data are supplied by the *Militär-Wochenblatt* (No. 12, of 1896):—

Charge *g.*	Muzzle Velocity.	Extreme Range.		Range with angle of descent of 30°
		Shell.	Shrapnel.	
	m.			
550	290	6,000	4,850	4,700
330	217	3,800	3,450	3,200
220	173	2,600		2,200

In view of these facts, the author of the *Militär-Wochenblatt* concludes that the French field howitzer can enter the fight already in the initial stage at long ranges, and he proceeds to say:—

"Although it has been hitherto believed that its principal *rôle* in the attack will be to work upon the intended point of assault, still, its high complement of shrapnel (55%) points to the intention that it is also to take part in the artillery fight proper.

"This, I think, certainly will be its main function in the defence, the more so, as firing at moving targets is to be the exception, according to the distinct wording of the regulations; and, on the other hand, targets for shell, such as prepared positions and obstacles, appear more generally on the side of the defence, and thus exist practically for the artillery of the attack only."

Journal R.U.S. Institution
Vol XL

Fig. 1.
120 mm Field Howitzer.

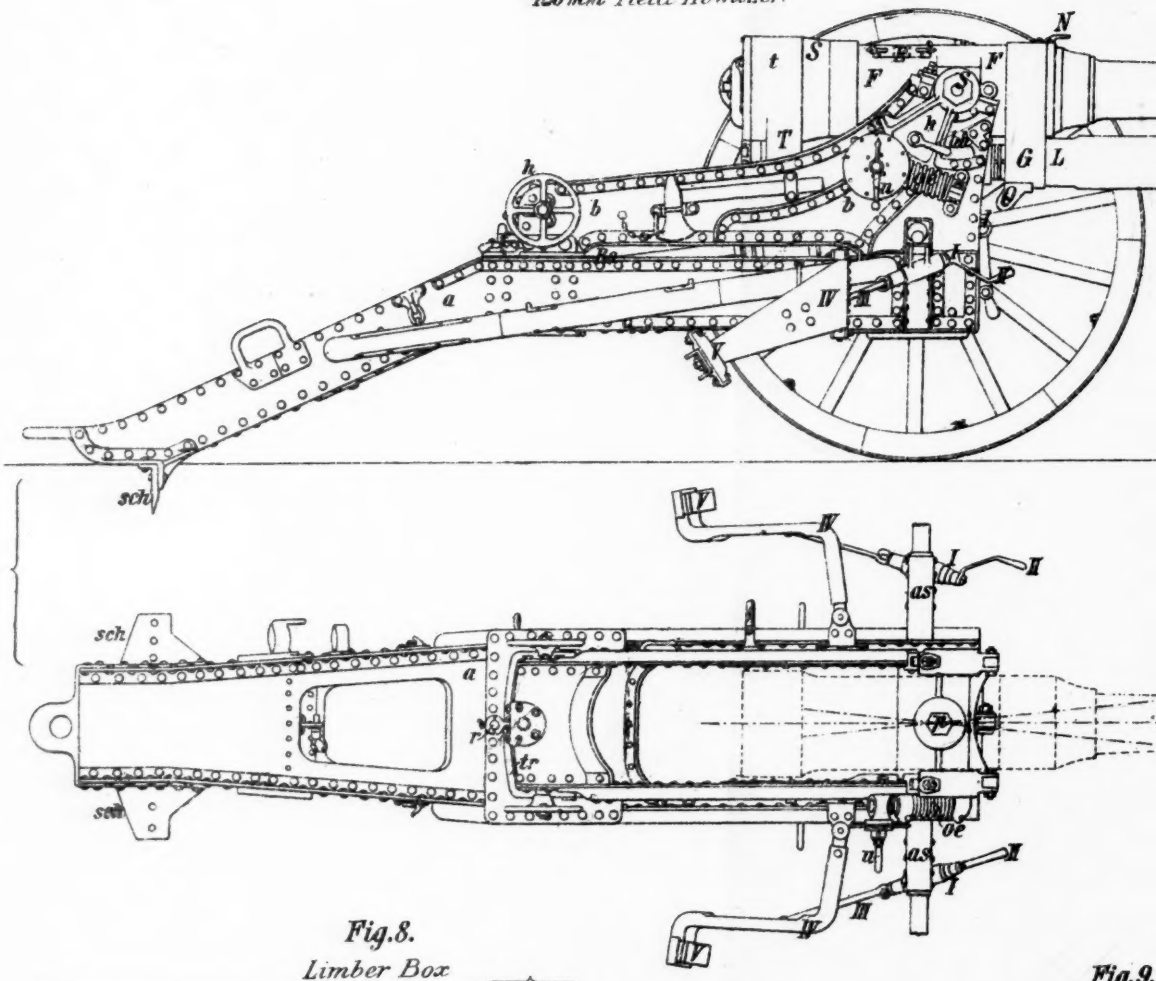


Fig. 8.
Limber Box

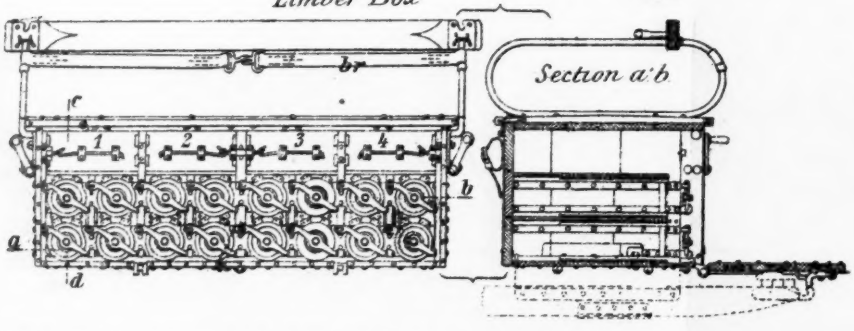
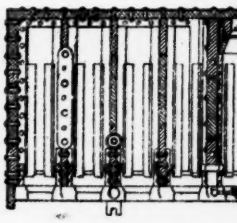
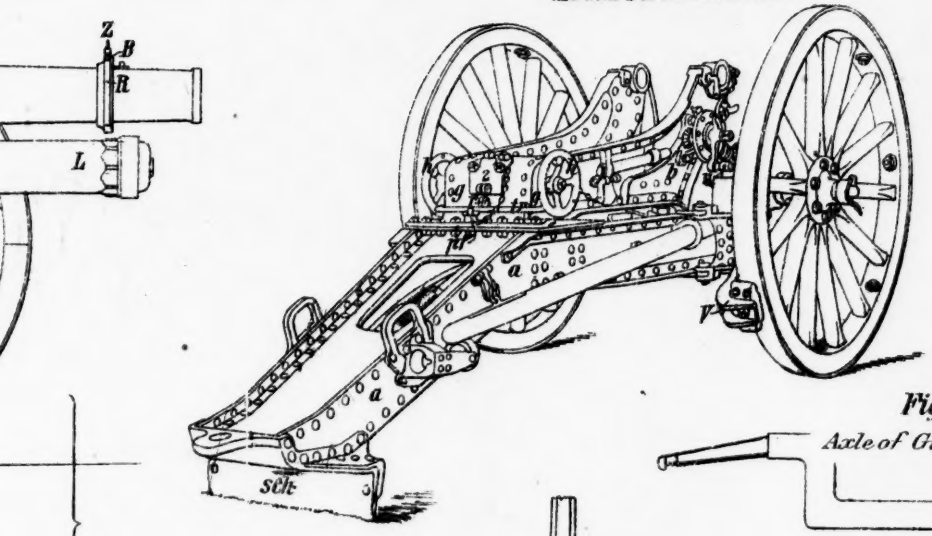


Fig. 9.
Shell Compar



J. J. Keliher & Co. Litho. London

Fig. 2.
120mm Field Howitzer



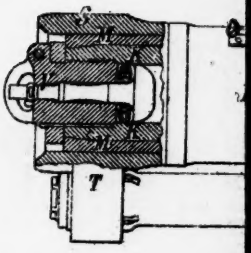
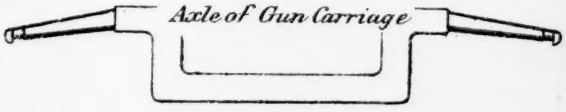


Fig. 5
Axle of Gun Carriage



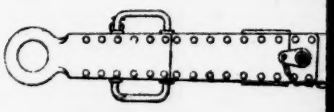


Fig. 7. *Limber*

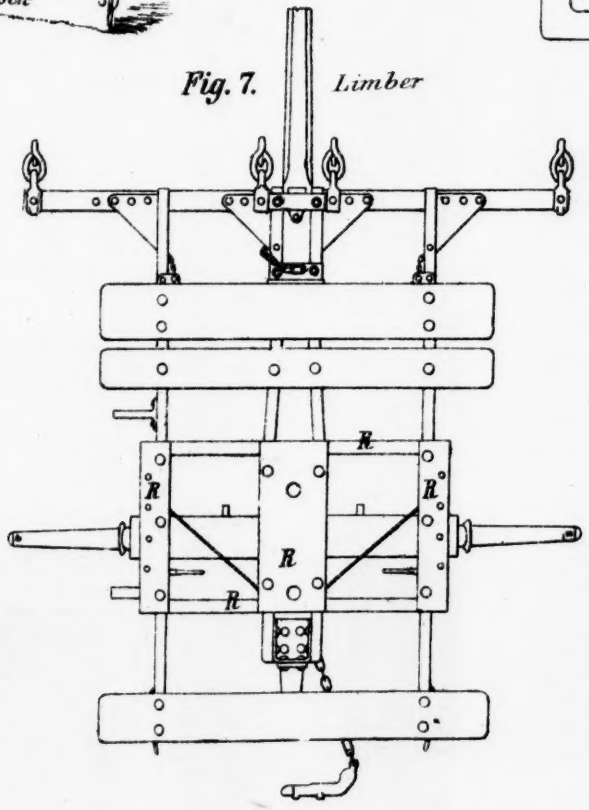
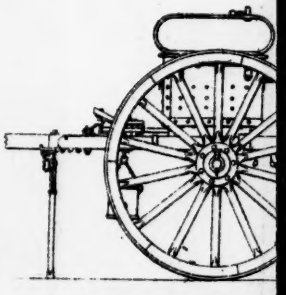


Fig. 6.
Traversing Gear



ig. 9.
mpartments

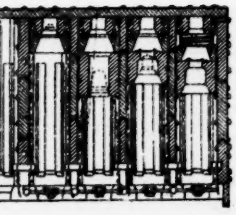


Fig. 3.

Barrel

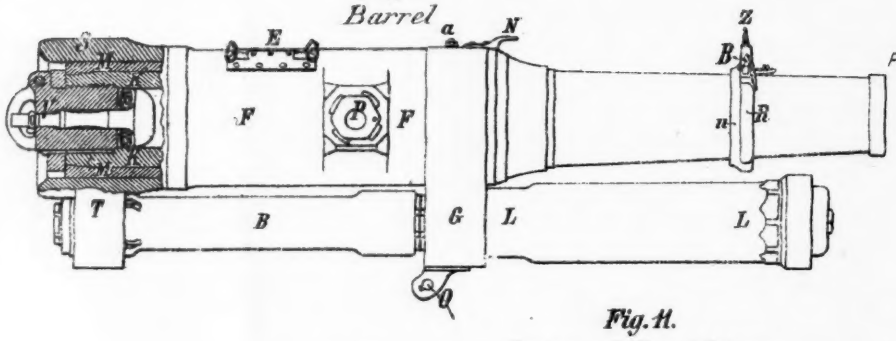


Fig. 11.

Frame of Hind Wagon

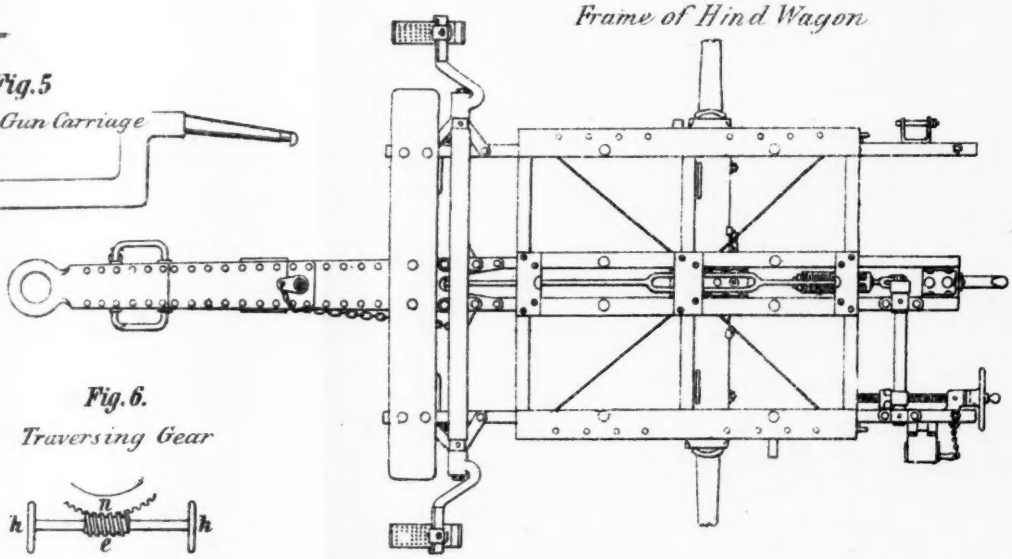


Fig. 5

Axle of Gun Carriage

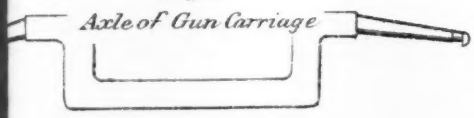


Fig. 6.

Traversing Gear

Fig. 10.

Ammunition Wagon

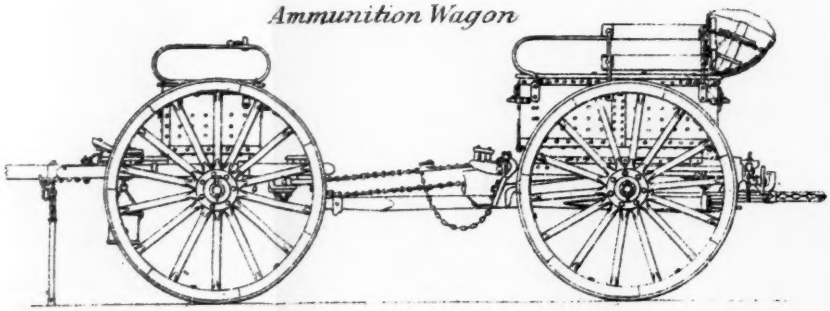


Fig. 4.
Buffer Tube

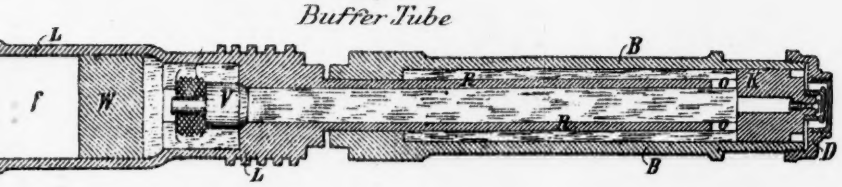


Fig. 13.
Shell Fuze M88

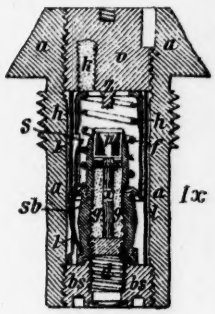


Fig. 12.
Box of Hind Ammunition Wagon

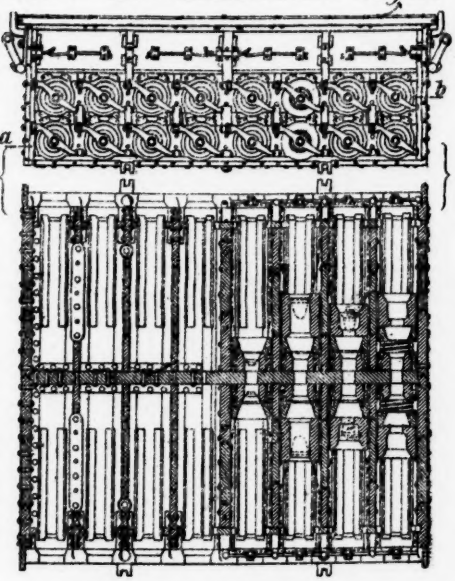
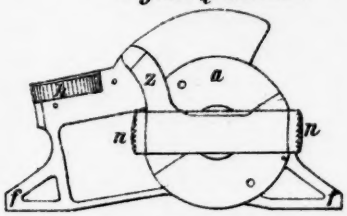
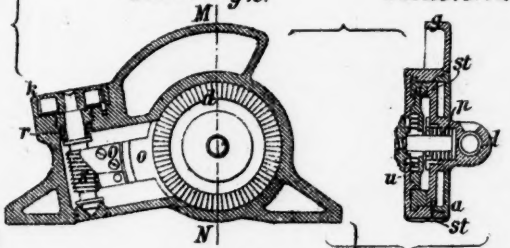


Fig. 15. Quadrant



Section g h.

Section MN



Top View

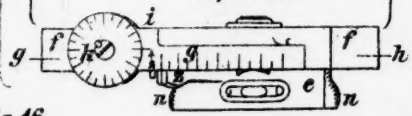
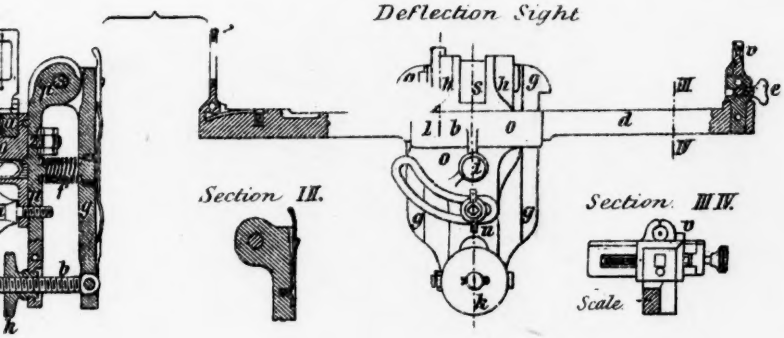


Fig. 14.
120 mm Shrapnel
M. 91.

Fig. 16.

Deflection Sight



Comparative Statistics of Various S

	Details.			French 120-mm.	Turkish (Krupp's) 12-cm.	Brazilian (Canet) 10-cm.	English Model "Armstrong" 12-cm.
				FIELD HOWITZER.			
BARREL.	Calibre		mm.	120	120	100	120
	Total Length of Barrel		mm.	1,700	1,400	1,300	1,596
			Calibres	14	11·6	13	13·3
	Length of the Rifled Portion		mm.	1,300	1,015	—	—
	Grooves	Number	—	36	36	30	—
		Depth	mm.	0·75	1·5	—	—
		Length of Twist	Calibres	7	Final Twist 15	—	—
	Angle of Twist		Degrees	8	—	1°·030′ to 7°	—
	Length of Sight Line (Tangent Scale)		mm.	1,360	570	475	—
	Weight of Barrel, including Breech		k.g.	with Conductor and Buffer Tube, 690	450	290	504
CARRIAGE.	Height to Muzzle		m.	about 1·1.	0·91	1·04	—
	Greatest possible	Elevation	Degrees	44	45	50	60
		Depression		12	5	0	0
	Gauge of Wheels		m.	1·47	1·53	1·20	—
	Weight of Gun Complete	Unlimbered	k.g.	1,475	1,115	885	1,230
		Limbered Up		2,365	2,100	1,455	2,182
	Draught per Horse (teams of 6 Horses, Gunners on foot)			394	With 6 Horses 350 / With 8 Horses 263	242	364
AMMUNITION.	Length of Shell		Calibres	4	4 | 3.1	2·6 | 3.2	—
	Material of Shell		—	Steel.	Iron. | Steel.		—
	Weight of Shell		k.g.	20·35	20	9·5	20·4
	Bursting Charge	Composition	—	Melinite.	Black Powder.		
		Weight	k.g.	6	2·5 | 1	0·4 | 1·02	1·8—1·9
	Shrapnel[1]	Length	Calibres	—	2·5	2·2	—
		Weight	k.g.	20·35	20	9·5	—
		Bursting Charge	g.	280	200	120	—
		Number of Bullets	—	630	460	205	278
		Single Weight	g.	12	16	—	—
	Powder Charge[2]	Maximum	g.	550 r	$\frac{1,500\,S}{500\,r}$	520 r	680 r
		Medium		330 r	$\frac{900\,S}{300\,r}$	—	—
		Minimum		220 r	$\frac{600\,S}{200\,r}$	—	—
RESULTS.	Muzzle Velocity with Charge	Maximum	m.	290	—	300	300
		Medium		217	—	—	—
		Minimum		173	—	—	—
	Extreme Range with Charge	Maximum	k.m.	6·6[3] / 4·85	5·8[3] / 5·4	—	—
		Medium		3·8 / 3·45	3·5	—	—
		Minimum		2·6	2.3	—	—

J. J. KELIHER & Co., London.

[1] The Mobile 15-cm. Battery Howitzer of the Austrian Artillery carries also Case Shot of 27 kg., with 440 b

[2] S = Black Powder, r = Smokeless Powder.

Systems of High-Angle Ordnance.

	German 15-cm. Howitzer.[4]	Austro-Hungary 15-cm. Mobile Battery Howitzer.[4]	Swiss 12-cm. (Position).	Spanish 12-cm. Model "Selgras."	Russian 6-inch.	Brazilian (Canet) 15-cm.	Krupp's 15-cm.
			FIELD MORTAR.				
	149·7	149	120	120	152·4	150	149·1
	1,700	2,000	1,500	858	1,372	1,200	1,250
	11·4	12·1	12·5	7	9	8	8·4
	1,216	1,280	—	585	—	—	—
	36	36	18	32	—	46	20
	1·3	1·5	1·5	1·5	—	—	1·5
	44·9 to 14·8	100 to 25	25	—	Final Twist 15	—	—
	4 to 12	1° 47′ 4″ to 7° 9′ 45″	—	4° 5′	—	1°·030′ to 7°	—
	660	1,000	920	—	—	450	—
	1,075	1,060	Bronze 631 Steel 534	285	460	390	450
	1·08	1·4	1·11	—	1·1	1·12	—
	65	45	60	70	47	50	45
	0	2	0	0	18	0	0
	1·53	1·53	—	—	1·52	1·220	—
	2,188	2,410	Bronze 1,474 Steel 1,377 (including Bed (175 kg.)	565	1,260	1·255	1,093
	2,565	2,730	Bronze 2,209 Steel, 2,112	With Bed (710) 1,855	2,100	2·100	2,086
	428	455	Team of 4 Horses 550	310	350	350	345
	5 | 3	2.8	3	3·3	—	2·6 | 3·2	4·1 | 3·2
	Steel.	Iron.	Iron.		Steel.	Iron. | Steel.	Iron.
	38·5 | 42·3	33	18	22	26	32	40
	Gun Cotton | Picric Acid.	Ecrasite.	White Powder.	Black Powder.	Black Powder. Melinite.	Black Powder.	—
	Not yet adopted.	2·66	0·76 + 1·85 Paraffin.	1·1	4·98 / 7·4	1·36 | 3·42	—
		—	Undecided at present.		—	2·2	2·7
		36·9			31	32	40
		470			247	320	—
		380			683	730	—
		24			21·3	—	—
	(850 r) 750 r	750 r	300 r	? S	1,740 S	850 r	1,500 S
	400 r 200 r	—	200 r	—	½ charge | 870 S	—	900 S
	100 r 50 r	350 r	100 r	—	¼ charge | 435 S	—	600 S
	(276)	291 / 276	226	220	220	200	—
	—	—	175	—	½ + ¼ Charge 179	—	—
	—	196 / 186	112	—	½ Charge 138	—	—
	(6·05)	6·6 [3] / 5·0	4·0	4·0	3·4	—	—
	—	—	2·6	—	½ + ¼ Charge Range = 2·13	—	—
	—	3·3 / 3·0	1·3	—	½ Charge Range = 1·7	—	—

[3] For Shell. / For Shrapnel.

[4] To be considered Guns of Position.

40 bullets weighing 43 g. each.

SHORT NOTES ON WAR BALLOONS.

By Captain H. C. PRICHARD, 2nd Batt. Northamptonshire Regt.

THE present Service Balloon, generally of from 10,000 to 12,000 cubic feet capacity, is filled with hydrogen gas, which being the lightest known, has of course the greatest buoyancy. The envelope or balloon itself is made of from five to seven thicknesses of ox bladders, and is intersected with strappings, in order to localise the effects of tears or rents. The net which encloses the balloon ends in a circular hoop, attached to the net by 100 small wooden toggles, and is made of 6-inch meshes at the top, which increase to 18 inches at the centre, and then again decrease. To this hoop is attached also by wooden toggles the six short stout ropes which carry the car. At the top of the balloon is a metal collar, some 20 inches in diameter, into which the gas valve, also of metal, fits. From this, running straight through the centre of the balloon, and coming out at the bottom or petticoat, is the valve line, the flying end of which is made fast to one of the car ropes, in a position convenient for letting out gas when necessary. The principal gear, always carried complete, on the assumption that a free run may have to be undertaken, consists of:—

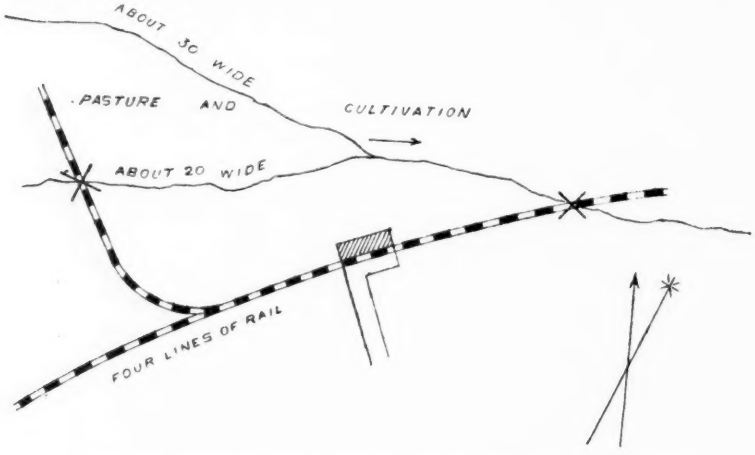
Grapnel and grapnel rope.
Knife in sheath and field glasses.
Aneroid to read 10,000 feet.
Thermometer, watch, compass, and maps.
Sand ballast, four or five bags of 20 lbs. each.

To these may be added, when a free run is actually contemplated, one or two small balloons about 2 feet in diameter, to be sent up before starting, as pilots, to determine the probable drift of the upper currents, and so enable one to form a reliable forecast of the probable direction of the journey.

Returning to the results that may be fairly looked for from the judicious use of captive balloons, it is clear that for reconnoitring the enemy's position or movements during a campaign, or during an engagement, particularly in the early and preparatory stages, great results may be obtained. On ordinary days when things are quiet at the front, an ascent by a captive balloon about a mile in rear of the outpost line offers great advantages. At a height of 1,500 or 2,000 feet in average weather and in fairly open country everything can be well seen for nearly five miles, and even in close English country, it is wonderful how much can be seen, for some three miles, of movement behind woods and hills.

For instance, during several free runs in the autumn of 1894, the atmosphere being fairly clear on all occasions, the writer, without the aid of glasses, noticed and noted down the following facts:—

At 500 feet could see individual people perfectly, *i.e.*, distinguish a rifleman from a linesman, etc.; at 1,500 feet could see details of a railway station, the breadth of the platforms as compared with the permanent way, and make a rough sketch, although at the time going 28 miles an hour, as for instance:—



At 2,200 feet, easily detected double line of rails, and had attention called to a passing train, by hearing the rumble below.

Again, at 2,850 feet, when passing over Bedford, could see every street and alley, and all the paths in the park distinctly, also hear various sounds, bells, dogs barking, etc. *A propos* of one's power of hearing and making one's-self heard, it is astonishing at what height one can ask the time, or the name of a place, and get the answer.

With regard to photography, at 900 feet the writer was able to take an excellent plate of Peterborough, showing plenty of detail, whilst going 36 miles an hour. Leighton Buzzard and Cookham were taken at 1,100 feet and 1,350 feet respectively, with good results, but of course less detail.

With regard to the transmission of information gained, it can in captive balloons be at once sent below, by placing written messages in small bags which, having a metal ring at one corner, easily run down the wire rope which holds the balloon captive. Lest anyone may ask how similar notes can be sent up from below, I may say that the following simple and ingenious plan has been adopted, viz., to attach a miniature balloon, say 2 feet in diameter to the carrier bag. The former on being set free, quietly tugs the latter up the wire rope. In addition to messages thus sent and received, rough but practical sketch maps can be leisurely made by a staff officer in the balloon. The advantages of the above surely need

no proof. Again, on days when it is suspected that the enemy means mischief and an engagement is possible, if not probable, a balloon, sent up about one mile in rear of the fighting line, in good time may well become the means of furnishing information invaluable to the general commanding, *e.g.*, the fact that although the enemy show an even front, they are really concentrating large masses on either, or both flanks; or again are bridging a river in a particular direction—facts which must furnish more than a clue to the enemy's main design. Of course, as in signalling, too much must not be expected later, when the action has developed and the details have become too confused for timely communication; but even then, chances may well occur of obtaining and transmitting information of great importance. Before quitting this short survey, the two risks suggested so confidently by our thoughtful friend must be touched on.

With regard to the enemy's cutting the rope which holds the balloon captive, it is clear that he must successfully pierce the outpost or fighting line, and drive in for about a mile before he can get to the wagon from which the steel rope is paid out. As this wagon has six horses attached it is evident that all hands must be very fast asleep if it is caught, seeing that on even bad ground it can move to the rear at a brisk trot. There is no need to bring the balloon down, as it is easy to tow it along. With regard to the enemy's chance of destroying the balloon by projectiles, it must be remembered that the nearest enemy will be from a mile and a half to two miles off, that the balloon is, say, 2,000 feet up, and that rifle bullets would pierce a balloon with holes far too small to be of any immediate consequence. Of course, a shell bursting near the balloon would be very unpleasant; but the chances of being shot at an estimated height of 2,000 feet are certainly less than on the ground below, and risks cannot all be eliminated any more than omelets made without breaking eggs.

To sum up, a bird's-eye view of the enemy's main dispositions can be obtained with very slight risk; information can be transmitted below with speed and certainty, even without a telephone. Further, and possibly more detailed, information may be looked for from time to time, and even good sketch maps made and quickly sent in to the general. To deprive himself of such an ally, at a time when knowledge is, indeed, power, would surely argue a general who had yet to learn the necessity of leaving to chance as little as possible.

NAVAL NOTES.

HOME.—The following are the principal appointments which have been made: Vice-Admirals—The Hon. Sir E. Fremantle, K.C.B., C.M.G., to be Commander-in-Chief at Devonport, in succession to Admiral Sir A. Lyons, K.C.B.; H. F. Nicholson, C.B., to be Commander-in-Chief at Sheerness, in succession to Admiral Sir R. Wells, K.C.B. Captains—E. P. Jones to "Grafton"; Hon. F. C. P. Vercher to "President," for special surveying service; P. M. Scott to "Scylla"; A. W. Chisholm-Batten to "Marathon." Commanders—H. W. Steele to "Racer"; E. Troubridge to "Shark"; H. L. Tottenham to "Starfish"; T. H. M. Jerram to "Curaçoa."

The new second-class cruiser "Scylla" is to proceed to the Mediterranean to relieve the second-class cruiser "Arethusa." The third-class cruiser "Tourmaline" has arrived home from the North American station, and will pay off at Sheerness. The second-class cruisers "Hermione" and "Charybdis" have been detached from the Particular Service Squadron, and have joined the Channel Squadron. The new first-class battle-ship "Hannibal" was launched at Pembroke, on the 28th April; she is identical with other ships of the "Majestic" class, which have already been fully described in previous issues of the JOURNAL.

The new second-class cruiser "Arrogant" was launched at Devonport on the 26th ult. She is the first of four of the same type now under construction from the designs of Sir W. H. White, Director of Naval Construction; the others being the "Gladiator," building at Portsmouth, the "Vindictive," at Chatham, and the "Furious," at Devonport. In size they are a medium between the second-class cruisers of the "Astræa" class and those of the "Talbot" type, and in several respects they differ from any cruisers yet built; being fitted for one thing with very powerful rams, the bows and fore-part of the ships being specially strengthened to enable the ram to be used with effect. The principal dimensions of the "Arrogant" are:—Length, 320 feet; breadth, 57 feet 6 inches; mean load draught, 21 feet; displacement, 5,800 tons. Her keel was laid on June 10th, 1895, and she was pushed forward so expeditiously that she might have been launched two months ago had her underwater fittings been ready. The engines are of the twin-screw, triple-compound, vertical, inverted-cylinder type, and are guaranteed to develop 10,000-I.H.P. They are placed abreast of each other, in separate engine-rooms, divided by a fore and aft watertight bulkhead. The foundation frames are of cast steel, and, though of specially strong form, are so designed that the engines are not dependent on any portion of the vessel's hull for structural stiffness. The aim of the design has been to make all the machinery as light as possible, consistent with strength and efficiency. Steel has, therefore, been used wherever possible, and the pistons, cylinder covers, valve chest covers, and slipper guides, like the foundation frames, are of this material. The high-pressure cylinder has a diameter of 26 inches, the intermediate of 42 inches, and the low of 68 inches, while the stroke is 39 inches. Condensers of the cylindrical type, with a cooling surface of 5,280 feet in each, are placed in the wings of the engine-rooms, and are connected with the low-pressure cylinders by means of copper exhaust pipes. The condensing water is pumped through by centrifugal pumps driven by independent engines. There are eighteen water-tube boilers of the Belleville type. They are arranged in groups of six in three independent boiler-rooms, divided by athwart-

ship watertight bulkheads. Any of the boilers can be used independently of the others, and, in the event of a fault developing in either the boiler or its fittings, it can be shut off from the general system. The steam pressure of the boilers is 300 lbs. per square inch, and by means of reducing valves placed in the main steampipes it is reduced to 250 lbs. per square inch at the engines. The boilers are not worked under what is ordinarily termed "forced draught," but large air-pumping engines are placed in the boiler-rooms, which force air at a considerable pressure into the furnaces over the fires, thus mixing the gases and completing the combustion of the fuel before reaching the uptakes. Fans driven by independent engines are fitted for ventilating the stoke-holds. As there are three distinct boiler-rooms it will be necessary to have three funnels, a novel feature for an English cruiser. The engines and boilers are being manufactured by Messrs. Earle's Shipbuilding Engineering Company, Hull. All pipes subject to the boiler pressure and consequent high temperature are made of mild steel, the larger pipes being lap welded and fitted with a butt strap over the weld, and those of smaller diameter are solid drawn. The boilers have a grate area of 860 square feet and a heating surface of 22,050 square feet. Other dimensions of interest are:—Connecting rod centres, 6 feet 6 inches; piston rod diameter, 7¼ inches; crank shaft diameter, 13¾ inches, external; and 7¾ inches, internal; air-pump, 27½ inches diameter and 11-inch stroke. The armament will consist of four 6-inch, six 4·7-inch, eight 12-pounder (12-cwt.), one 12-pounder (8-cwt.), and three 3-pounder guns, all Q.F. There will also be five Maxim machine-guns, and two 18-inch submerged torpedo-tubes. From a fighting top on the vessel's mast a 3-pounder Hotchkiss Q.F. gun will be worked. The "Arrogant" is to be completed for sea by March, 1897.

The new first-class cruiser "Terrible," will be delivered at Portsmouth, from the works of Messrs. J. and G. Thomson, Glasgow, about June 24th, and it is now expected that the new dock will be ready for use by July 1st, so that there will be no delay in docking the ship, if all goes well. The new second-class cruisers "Eclipse" and "Minerva," which have been built and engined at Portsmouth and Chatham respectively, will have their steam and gun trials in the third week in June. The "Talbot," a sister-ship, at Devonport, is to undergo an inclining experiment in order to ascertain if her stability will justify the fitting of a military top on her mast. If the report is favourable the "Eclipse" and the "Minerva" will be similarly fitted. The new first-class battle-ship "Prince George," at Portsmouth, is progressing rapidly, and the whole of her heavy armour, weighing 2,600 tons, is now in place. Half of her casemate armour is also in position, but her shield armour has yet to be delivered. Owing to the pressure that is being exercised to complete the "Prince George" and "Eclipse," the new battle-ship "Cæsar" will not be ready for floating out of dock until the end of July or beginning of August. The new first-class battle-ship which is to be laid down at Chatham during the ensuing financial year is to be completed in the exceptionally short period of twenty months. The record time hitherto for a first-class battle-ship has been just under two years.

The new second-class cruiser "Talbot" has completed her steam trials in the most satisfactory manner. Considerable interest was felt at Devonport, where she was built, in the trials, as her engines and boilers were manufactured at Keyham, her machinery being the largest and most powerful ever turned out from a Government yard. For her eight hours' natural-draught trial the preliminary arrangements were soon completed, and the manner in which the actual trial commenced satisfied the engineering officials that the vessel was going to do credit to her builders. This confidence was not misplaced, for, with a minimum of air pressure in the stoke-holds, she easily maintained an I.H.P. considerably in excess of that for which her machinery was guaranteed, and realised a speed of three-quarters of a knot per hour above that for which she was designed. The mean results for the eight hours were:—Steam, 142 lbs.; vacuum—starboard, 25·6

inches; port, 25; revolutions starboard, 133; port, 131·1; I.H.P.—starboard, 4,256; port, 4,206; total, 8,462 (the conditions under which she was built provided for 8,000-I.H.P., under natural draught); air pressure ·41 of an inch; speed, 19·2 knots (designed speed, 18·5 knots). Before the trial commenced the vessel was brought to a mean load draught of 20 feet 6 inches, this being the depth of water she will draw when in commission and fully equipped for service. The four hours' run under forced draught was equally successful, the following being the mean results:—Air pressure, 1·06 inch; steam, 144 lbs.; vacuum—starboard, 25; port, 25; revolutions—starboard, 140·2; port, 138·9; I.H.P.—starboard, 4,957; port, 4,819—total, 9,776-I.H.P.; speed, 20 knots. The machinery worked very smoothly, and there would have been no difficulty in exceeding the H.P. attained without in any way incurring the risk of a breakdown. The guaranteed I.H.P. was 9,600, and although this was only slightly exceeded, the vessel attained a speed of half-a-knot an hour in excess of that provided for. The coal consumption trial took place with the engines working at three-fifths of her natural-draught power, this being the most economical rate at which this class of vessel can be steamed for any length of time. The mean results for the thirty hours were:—Vacuum—starboard, 26 inches; port, 26 1; revolutions—starboard, 114·9; port, 113·5; I.H.P.—starboard, 2,451; port, 2,462; total, 4,913; air pressure *nil*; speed, 16·68 knots. The coal consumption record was 1·84 lbs. of coal for each I.H.P. per hour. The new torpedo-boat destroyer "Haughty," which has been built by Messrs. Doxford and Sons, of Sunderland, has undergone a very successful three hours' full-power trial of her engines and machinery off the Maplin Sands. Although the contract speed was only 26 knots, the mean speed for six runs on the measured mile was 27·949 knots, while for the three hours it averaged 27·525, the I.H.P. obtained was 4,224, and the number of revolutions was 363·4. The results were even better than had been anticipated, especially as the sea was rough. The steering and anchor trials were also satisfactory.

The urgent need for further dock accommodation at Chatham has impressed itself on the Lords of the Admiralty, and under instructions plans are being prepared for the work. One proposal is to build a dock contiguous to the existing basins sufficiently long and wide to accommodate such vessels as the first-class cruisers "Powerful" and "Terrible." At present Chatham could not dock vessels of this class, although they could be received in the basins. This work could be completed in two years. Another project, on a larger scale, which would take at least five years to complete, is the construction of a basin on a portion of the extensive area of ground on the north side of the existing basins. The scheme includes the provision of a lock of very large dimensions, opening directly on the Medway. It would be possible to receive in such a lock the longest of our ironclads, even in a water-logged condition, and carry out temporary repairs, prior to the docking of the vessel.

It has been practically decided that the extensive moorings recently laid down in the Hamoaze, above the Royal Albert Railway Bridge, at Saltash, shall be appropriated for berthing all the new second-class cruisers of the "Talbot" type. There are nine of these vessels in course of construction—the "Talbot," at Devonport," the "Eclipse," at Portsmouth, the "Minerva," at Chatham, the "Venus," "Diana," "Dido," and "Isis" on the Clyde, and the "Juno" and "Doris" at Barrow-in-Furness. The three vessels building at the Government dockyards are to be completed and ready to take up their moorings at Devonport by August. The others will not be so far advanced until the end of the year. Arrangements have been made for the "Venus" and "Diana" to be completed for sea at Chatham, the "Dido" and the "Isis" at Portsmouth, and the "Juno" at Devonport. It is not until the vessels are passed into the Fleet Reserve that they will proceed to their moorings at Devonport.

It is reported that the 12-pounder gun now carried forward by the torpedo-boat destroyers is to be removed, and a 6-pounder substituted, the vessels not

being considered strong enough to stand the recoil of the heavier gun. This change is said to be the result of Rear-Admiral Wilson's Report after the manœuvres last year.

The Admiralty have decided to commission more torpedo-boat destroyers for service with the Mediterranean Squadron. The flotilla will consist of six destroyers, the "Haughty," "Porcupine," "Ranger," "Havock," "Surly," and "Skate." These vessels will be stationed at Malta, and in time of peace will be utilised for the instruction of engine-room ratings. The addition of these vessels to the strength of the Mediterranean Squadron is a most important step.—*Times* and *Naval and Military Record.*

ARGENTINE GOVERNMENT.—On the 16th ult. was launched from the yard of Messrs. Yarrow and Co., at Poplar, the "Santa Fé," a torpedo-boat destroyer, which is the first of four sister-vessels for the Argentine Navy. The length over all is 190 feet 8 inches, the breadth 19 feet 6 inches, and the depth 12 feet. The hull is built of mild steel, but the special feature of these destroyers is that they are partially armoured and thus protected against the smaller class of projectiles throughout the entire length of the machinery space, and there are half-inch steel bulkheads, which divide the engine and boiler spaces from the rest of the vessel. The sub-division of the other parts of the hull is also of the usual description. The engines are of the triple-expansion type, having cylinders 18 inches, 26 inches, and 39½ inches in diameter by 18-inch stroke. There are six boilers of the Yarrow type, each having a method of feed regulation, which has just been introduced by this firm. The armament consists of three 18-inch torpedo discharges, one 14-pounder, and three 6-pounder Q.F. guns, and two Maxim machine-guns. The estimated speed is 26 knots.—*From information supplied by Messrs. Yarrow.*

CHILI.—On the 16 ult. was launched at Birkenhead, from the works of Messrs. Laird Brothers, the new torpedo-boat destroyer "Teniente Serrano," the third of four building by this firm for the Government. These vessels are 210 feet long, with a beam of 21 feet 6 inches; the engines are to develop 6,000-I.H.P., giving a speed of 30 knots. This is the seventh 30-knot destroyer launched during the last eight months by Messrs. Laird.

Six first-class torpedo-boats are being built by Messrs. Yarrow and Co.; they are 152 feet 6 inches in length by 15 feet 3 inches beam, and will be propelled by triple-expansion engines, to give a guaranteed speed of 25½ knots. The bunker capacity is 40 tons, which will give a very large range of action. The I.H.P. will be about 2,000, and they will be an improvement on the "Viper," which vessel was lately built by the firm for the Austrian Navy. This vessel, it will be remembered, attained a speed for three hours—carrying 26 tons—of 26·6 knots, with a consumption of 1·9 lbs. of Welsh coal per I.H.P. per hour, with an air pressure of $\frac{7}{8}$ of an inch in the stokehold.—*From information supplied by Messrs. Laird and Messrs. Yarrow.*

FRANCE.—The following are the principal promotions and appointments which have been made: Vice-Admiral—A. Besnard to be Minister of Marine. Capitaine de Frégate - F. H. Pelletier to be Capitaine de Vaisseau. Capitaines de Vaisseau —Y. Bory to "Amiral-Tréhouart"; Aubry de la Noë to Chief of the Military Cabinet of the Minister of Marine; Le Dô to "Lapérouse." Capitaine de Frégate—M. J. Baudry-Lacantinerie to "Calédonien"; P. Auvert to "Scorff"; A. C. Raffenel to "Casabianca."—*Le Moniteur de la Flotte.*

The new first-class battle-ship "Jauréguiberry" commenced her official trials on the 20th ult., off Toulon. During a six hours' run under natural draught a mean speed of 17·6 knots was easily maintained, the contract being for 17 knots,

the engines developing 13,820-I.H.P. and making ninety-six revolutions; the consumption of coal per H.P. per hour being only 790 grammes, instead of 900 grammes, the amount allowed. These results are highly satisfactory to the officials of the Société des Forges et Chantiers at La Seyne, who built the ship and made the engines and boilers. The new coast-defence battle-ship "Amiral-Tréhouart" has completed satisfactorily her official trials at Brest. In the first trial, with the engines developing 2,400-I.H.P. and making eighty-four revolutions, the consumption of coal per H.P. per hour being 642 grammes, a speed of 11·3 knots was obtained; during the twenty-four hours' run under natural draught the engines developed a mean of 5,220-I.H.P., making ninety-six revolutions, the mean speed for the run being 14 knots, and the coal consumption per H.P. per hour 734 grammes. During the three hours' run under forced draught the engines developed 8,350-I.H.P., making 112 revolutions, giving a mean speed of 15·7 knots, the coal consumption per H.P. per hour being 1·1 kilogrammes and the consumption for each square metre of grate 160 kilogrammes. The "Amiral-Tréhouart" will fully commission on the 16th inst., and will then join the Squadron of the North. The new first-class battle-ship "Charles-Martel" has commenced her trials at Brest; with the engines developing only 2,000-I.H.P. and making forty-eight revolutions, a speed of 9·5 knots was obtained. The new second-class cruiser "Descartes" has been continuing her preliminary trials at Brest satisfactorily. At a four hours' full-speed run the engines developed 8,600-I.H.P., a mean speed of 19·5 being obtained.

The third-class cruiser "Fabert" commissioned on the 12th ult. at Brest to relieve a similar ship, the "Dupetit-Thouars," on the East Indian station; both vessels are old and built of wood. The new gun-boat "Surprise," which completed her trials some two months ago, and was to have left for China, has had to be paid off and placed in the second category of the Reserve at Cherbourg, to have new tubes fitted to her boilers and other defects made good, which had developed themselves at the last moment The third-class cruiser "Coëtlogon" is to be paid off at Lorient at the conclusion of the annual manœuvres in the autumn. The third-class cruiser "Éclaireur" is to be commissioned to relieve the "Roland," a sister-ship, in the North Atlantic Division; both these cruisers are old wooden vessels. The new boilers for the new torpedo-cruiser "Fleurus" are now ready, and will be placed on board through an opening which has been made in the lower part of the hull, in order to avoid having to displace the armoured deck in any way. This vessel was launched as long ago as 1893, but after a long series of trials her boilers had to be removed and new ones made.

The new second-class cruiser "Cassard" was successfully launched at Cherbourg on the 27th ult. Her dimensions are as follows:—Length, 325 feet 8 inches; beam, 44 feet 10 inches; and with an extreme draught of 20 feet 5 inches the displacement will be 3,952 tons. Two sets of vertical, triple-expansion engines, supplied by D'Allest boilers, are to develop 6,000-I.H.P. under natural and 9,500-I.H.P. under forced draught, giving a speed of 17·5 knots and 19·2 knots respectively. The coal supply is 624 tons, giving a radius of action at 10 knots of 6,000 miles and of 1,000 miles, at full speed. The protection consists of a steel deck with a maximum thickness of 2·3 inches, and the guns will have shields of hardened steel. The armament will consist of six 16-centimetre (6·3-inch), four 10-centimetre (3·9-inch), ten 3-pounders, eleven 1-pounders, all Q.F., with two above-water torpedo-tubes. She will have a complement of 385 officers and men.

It is a fact worthy of notice that the works at Biserta connecting the land-locked lake with the sea are now completed, and that the largest battle-ships can find shelter in the secure harbour formed by the lake. On the 14th ult., the Active Division of the French Mediterranean Squadron, under the command of Vice-Admiral Gervais, passed into the lake through the new canal and anchored safely; the "Brennus," the Admiral's flag-ship, being a vessel drawing between 26 and 27 feet.

The first-class battle-ship "Hoche" (see frontispiece), the new flag-ship of the French Northern or Channel Squadron, although laid down as long ago as 1880, is yet a very formidable ship. Her dimensions are as follows:—Length, 333 feet; beam, 65 feet 7 inches; and with a displacement of 10,650 tons she has a mean draught of 26 feet. Her engines develop 11,300-I.H.P. under forced draught, giving a speed of from 15·5 to 16 knots. Protection is afforded by a complete water-line belt of 18-inch armour tapering to 14-inch at bow and stern, and an armoured deck with a maximum thickness of 3-inch plating. The four barbette turrets for the heavy guns, one forward, one aft, and one on each beam, are protected by 14-inch armour, that for the ammunition-tubes being 3 inches thick. The armament consists of two 34-centimetre (13·3-inch) guns, one forward and one aft in the turrets; two 27-centimetre (10·6-inch) guns in barbettes, one on each beam; eight 14-centimetre (5·5-inch) Q.F. guns on the broadside in an unprotected central battery; four 6-pounder Q.F. guns, and twenty small Q.F. and machine-guns with five torpedo-tubes. The ship has a low free-board fore and aft, with a heavy and lofty superstructure for some two-thirds of her length; originally she had two military masts, and a secondary armament of eighteen 14-centimetre guns, but some three years ago it was discovered that she was gravely wanting in stability, so her after military mast was removed, with ten of her 14-centimetre guns, and some portion of the superstructure; but like all the French modern battle-ships, she still presents a very large target, and has the grave defect of there being no proper support for her turrets, as they are considerably above the armoured belt, and their bases have no protection.—*Le Yacht* and *Le Moniteur de la Flotte.*

Russia.—On the 12th ult. the Tsar was present at the launch of the coast-defence battle-ship "General-Admiral Apraxin," and of the armoured-cruiser "Rossia," the former from the New Admiralty Yard, and the latter from the Baltic Works, at St. Petersburg. His Majesty also christened the keel of the new armoured gunboat "Gilyak." The dimensions of the "Apraxin" are as follows:—Length, 275 feet; beam, 52 feet; displacement, 4,126 tons, with a mean draught of 17 feet. The engines are to develop 5,000-I.H.P., giving a speed of 16 knots. The normal coal supply is very small, being only 215 tons. Protection is afforded by a partial belt, for 177 feet of her length, of 10-inch armour; there will be two turrets, one forward and one aft, plated with 14-inch armour, two athwartships 8-inch armoured bulkheads, and a 3-inch armoured deck. The armament will consist of four 10-inch guns, two in each turret, four 6-in. Q.F. Canet guns, six 3-pounder Q.F. and eight 1-pounder Q.F. guns, with four torpedo-tubes.

The armoured-cruiser "Rossia" is the longest vessel ever launched on the Neva, and the largest Russian ship of the kind afloat. As a matter of fact, she ranks with, perhaps before, the English "Powerful" and "Terrible," which are about 14,200 tons. The "Rossia" is more or less a copy of the "Rurik," but larger and more powerful. The "Rurik" is 426 feet long, with 10,933 tons displacement. The "Rossia" is 464 feet between perpendiculars, with a displacement of 12,195 tons. Including the ram, the full length of the "Rossia" is over 480 feet, and her greatest breadth over all is 68 feet. The "Rossia's" coal-carrying capacity is 2,500 tons. Her triple-expansion engines, made at the Baltic Works, are of 17,000-I.H.P., and her expected speed is 20 knots. The boilers, thirty-two in number, are of the Belleville type, made in France. There is a 10-inch armoured belt, running two-thirds the length of the ship, closed in by 9-inch armour athwartship bulkheads; the armour plates have been made at the Carnegie Mills in America. The cruiser has a double bottom and 149 water-tight compartments, and carries fourteen different boats, including steam launches. Her armament will consist of four 8-inch guns; sixteen 6-inch Q.F. guns; six 4·7-inch Q.F.; and 18 small Q.F. guns, with five torpedo-tubes. It is reported that the "Rossia," however, is to be followed by a still larger cruiser of a similar type. It is intended to lay down one of 14,000 tons, which is to be the largest and

most powerful cruiser in the world. Of the battle-ships in hand, the "Poltava," 10,960 tons, is nearly ready to begin her trials. Her turrets are ready for the guns, but work upon the side armour, which is being made by the Krupp firm at Essen, has been retarded. Her sister-ship, the "Petropavlovsk," has her armour complete, while the "Sevastopol" has just received from the Putiloff Works her engine framing. The engines themselves have been built at the Franco-Russian establishment. Progress is also being made with the "Peresviet" and "Osslyabya," 12,674 tons, the former at the Baltic and the latter at the New Admiralty Yard. The engines for both will be from the Baltic Works. The smaller battle-ship "Sissoi Veliky," 8,830 tons, launched in 1894, is progressing rapidly, and the heavy guns have been mounted in one of her turrets, and, with the "Admiral Seniavine," which was launched in August, 1894, but has not yet received her guns, will be ready for her sea trials shortly. The armoured gunboat "Khrabry," 1,492 tons, which was launched at the New Admiralty Yard in November last, has not yet received her machinery, but the engines are in hand at the Baltic Works. Her boilers will be of the Niclausse water-tube type. The training-ship "Vierny," launched at the same time at the Baltic Yard, has received Belleville boilers (1,500-I.H.P.), and is almost ready for sea. A transport of 1,000 tons is in hand at the Neva Yard, for which the engines are being built at the Baltic establishment, and two second-class cruisers are about to be laid down at the Galierny Ostrov, for which the Franco-Russian Company will make the engines. The "Viborg," first-class torpedo-boat, is receiving a special instalment for the use of liquid fuel, which is expected to increase her range of action greatly, and her trials are to be followed by a special committee, the idea being to introduce liquid fuel in all vessels of the class. Ten torpedo-boats of the "Pernov" type are in hand at the Neva Works, where very great difficulty has been found in casting the cylinders, many having been rejected. The engines are to be of the Du Temple type.

On May 16th an official trial was made off the Tyne of the Russian Volunteer Fleet steamship "Kherson," which has been built and engined by Messrs. R. & W. Hawthorn, Leslie and Co., of Newcastle-on-Tyne. This vessel, which is the thirteenth of the fleet, is arranged to carry an armament of seven 4·7 Q.F. guns and twenty other guns of smaller natures. These are kept in store at Odessa, to be shipped in case of war. She is a twin-screw vessel, 493 feet long and 54 feet 3 inches wide. The engines are of the triple-expansion type. The chief interest in the machinery department centres in the boilers. These are of the Belleville water-tube type, similar in construction to those which are being placed in the British cruisers "Powerful" and "Terrible," now in course of completion. On a twelve hours' trial the "Kherson" made her contract speed of 19·5 knots, but the H.P. exceeded the estimate, the mean of the twelve hours being 13,150-I.H.P. The sea was rather rough, which detracted somewhat from the speed. The steam pressure of 250 lbs. was maintained with ease during the trial, although the stokers were quite unused to this type of boiler. The boilers were supplied by Messrs. Maudslay, Son and Field, of London.

The Russian Black Sea Fleet has been celebrating its 200th anniversary. It was brought into being by Peter the Great, in May, 1696. Its immediate object was the capture of Azov, which it was hopeless to attempt to wrest from the Turks unless they could be prevented from sending reinforcements and supplies into the mouth of the Don. The plans came from Holland, the workmen from England, the pieces of the boats were hewn in Moscow, and joined together on the banks of the Vorónesh. Peter laboured with saw and hatchet, and St. Mitrophan, the wonder-worker, then plain Bishop of Verónesh, looked on and blessed the work. Thanks to his blessings and Peter's perpetual grant of candles and incense to the cathedral, Azov was taken. Russia got a footing on the shores of the Black Sea, and obtained her first ice-free port. From Peter's squadron of galleys,

galliasses, and fire-ships, has now grown the formidable and rapidly-developing fleet which has its ports and docks at Nikolayef and Sevastopol.

The Minister of War has published the reports on the combined naval and military manœuvres in the Black Sea, in 1895. The plan of operations consisted in embarking an army-corps, its transport and subsequent disembarkation close to Otchakov, in spite of the efforts of the naval and military defending forces.

The attacking corps consisted of:—12 battalions, 1 sotnia of Cossacks, 6 field-batteries, and one company of engineers, who were embarked at Sebastopol; and 8 battalions, half a sotnia, 2 light batteries, 1 company of fortress-artillery, 2 companies of engineers, and a detachment, who embarked at Odessa, making a grand total of:—20 battalions, 1 sotnia and a half, 8 field-batteries, 1 company fortress-artillery, 3 companies of engineers, and a detachment.

The transport was effected by 6 ships (4 belonging to the Black Sea Fleet and 2 to the Volunteer Fleet), under the protection of a squadron composed of 4 battle-ships, 2 gun-boats, 1 torpedo-cruiser, and some torpedo-boats.

The defending force was composed of the garrison of Otchakov, consisting of:—1 battalion of reserve infantry, 1 battalion of fortress-artillery, 1 company of engineers, and further of 5 battalions of infantry with a detachment of bicyclists.

The frontier-guards were utilised for look-out purposes along the coast, and there was also available for the defence a flotilla composed of 2 gun-boats, 2 transports, and some torpedo-boats.

The embarkation of the troops at Sebastopol took place on the night of the 27th-28th August, and was completed on the morning of the latter day. The squadron put to sea at 9 a.m., having the gun and torpedo-boats as an advance guard.

The strong town of Otchakov is situated at the head of the Gulf of Odessa, where the common estuary of the Bug and Dnieper debouch close to the old fortress of Kinburn. The coast, which is generally low and sandy, is intersected by the embouchures of a series of water-courses, which form on arriving at the sea, brackish shallow lagunes, termed in the south of Russia "limans."

On the morning of the 29th August the fleet arrived at the point chosen for the landing, a little to the west of the liman of Bérésane, about 15 kilometres from Otchakov, into which harbour, in order to protect the disembarkation, the squadron first forced the defending flotilla. The landing was effected under some difficulties, as the weather was bad and a fresh north-westerly wind made a considerable surf, which prevented many of the boats from approaching the shore, so that the men had to wade in some cases up to their necks in water. In spite of all difficulties the whole force was landed by 2 p.m. The squadron then embarked the troops from Odessa, which were landed under more favourable circumstances, and on the 31st August the whole force crossed the Bérésane, driving the defenders back on the fortress. This concluded the operations.

Some very successful tests of armour plates were held on the 24th March at the Indian Head Proving Ground, in the United States, when a group of armour was accepted from the Carnegie Company by the Russian Government as a result of the conduct of a ballistic plate. The plate, 5 inches thick, was fired at six times with five 4-inch shells and one 5-inch shell, and only the last shot succeeded in doing any damage. Under the contract requirements only four shots were necessary and the armour repelled these with ease. The fifth and sixth shots were experimental and demonstrated to the satisfaction of those witnessing the trial that the plate was an excellent one. The armour was manufactured by the Carnegie Company, under a contract for 1,100 tons made with the Russian Government some months ago. Of this amount 350 tons are to be of 5 inches in thickness, 350 tons of 10 inches and 400 tons of 14 inches. The plate was attached to a 36-inch oak backing, and was manufactured under the double-forging process. This is the

first plate of this calibre which has received the double-forged treatment. Squares of 12 square feet were marked off on the plate and the six shots, five of 4 inches in calibre, weighing 33 lbs. each, and one of 5 inches, weighing 60 lbs., were delivered each in one of these squares. The first shot struck the plate with a velocity of 1,740 feet per second, the second with 1,660, the third with 1,690, and the fourth with 1,760. All of these shells smashed on the face of the plate, after making a penetration of only a couple of inches. The fourth shot produced a crack in one corner, which was widened by the fifth shot, delivered at a velocity of 1,760 feet per second. The sixth shot of 5 inches in calibre and fired with a velocity of 1,705 feet per second, although delivered some distance from the crack, produced a vibration which caused the fragment of about 1 foot in diameter to break off. There was present at the test Post-Captain Mertwago, the naval and military agent of Russia, who represented his Government, and who expressed himself as very much pleased with the result of the trial, and stated that the armour was perfectly satisfactory.—*The Times*, *La Marine Française*, and *Army and Navy Journal.*

UNITED STATES.—On Saturday, March 28th, the "Iowa," the fourth and largest of the first-class battle-ships building for the Navy, excepting the "Kearsage" and "Kentucky," yet to be begun, was successfully launched. Appropriated for by Act of Congress approved July 19th, 1892, the work was awarded to William Cramp and Sons, February 11th, 1893, and the August following her keel was laid. The ship followed after her coast-line prototypes, the "Indiana," "Massachusetts," and "Oregon," and in design was purposed to excel the earlier ships, and how much so she does a comparison with the "Indiana" will show :—

"Indiana": Length on load water-line, 348 feet; breadth of beam, extreme, 69 feet 3 inches; displacement in tons, normal draught, 11,410; mean draught at normal displacement, 24 feet; freeboard forward, 11 feet 8 inches; normal coal supply, 400 tons; total coal capacity, bunkers filled, 1,640 tons; maximum I.H.P. contract, 9,000; speed in knots contract, 15; complement of officers and crew, 460.

"Iowa": Length on load water-line, 360 feet; breadth of beam, extreme, 72 feet 2·5 inches; displacement in tons, normal draught, 11,410; mean draught at normal displacement, 24 feet; freeboard forward, 19 feet; normal coal supply, 625 tons; total coal capacity, bunkers filled, 1,780 tons; maximum I.H.P. contract, 11,000; speed in knots contract, 16; complement of officers and crew, 490.

The hull is of steel, with a double bottom and close water-tight sub-divisions extending up to a height of 10 feet above the load water-line. The formation of the sides amidships, where they roll inboard, secures increased freeboard, without the added weight consequent if the lines were carried up with the water-line fulness, gives an easier curve of stability, roomier quarters for the crew, greater sweep for the guns in the broadside sponsons, and promises efficiency of the great guns in almost any fighting condition of the sea.

For a distance of 185 feet amidships the water-line region is protected by a 7½-foot belt of 14-inch steel, 3 feet above and 4½ feet below the water-line. The forward and after ends of this belt turn inboard and run athwartship with a thickness of 12 inches. Upon the walls so formed rests a flat protective deck of steel 2¾ inches thick, and from the lower edges of the athwartship bulkheads, running forward and aft to the bow and stem, are two other protective decks 3 inches thick, the forward one terminating just back of the ram. From the top of the broadside belt and up to the line of the main deck, running forward and aft amidships for a distance of 90 feet, the sides are 5 inches thick, backed by a number of feet of coal and several inches of heavy yellow pine. Forward and abaft the casemate armour, from the protective deck up to the main deck, the outside plating is backed by a wide cofferdam filled with cellulose and divided into numerous compartments.

The "Iowa" will carry a main battery of four 12-inch breech-loading rifles, mounted in pairs, in two barbette turrets of the balanced type 15 inches thick, firing through an arc of 270°, and eight 8-inch rifles in four barbette turrets 8 inches thick, mounted on the upper deck, and possessing individual arc of fire of 170°. The secondary battery will be composed of six 4-inch rapid-fire rifles, four of which are mounted on the main deck in armoured sponsons and sheltered by thick splinter bulkheads of steel, and the two remaining mounted aft on the bridge deck, sheltered by fixed shields. Twenty 6-pounder, four 1-pounder and four Gatling guns will constitute an auxiliary force and be mounted on the main deck, on the superstructure and bridges and up in the tops of the military mast. From the bow and two places on either broadside there are torpedo-tubes for the discharge of torpedoes.

The propelling machinery will consist of three double-ended boilers 21 feet long, with diameters of 16 feet 9 inches, and two single-ended boilers 10 feet long, with diameters of 16 feet 9 inches, in four water-tight compartments, and of two sets of triple-expansion engines, each in its own compartment and driving its own shaft, having cylinders of 39, 55, and 85 inches and a common stroke of 48 inches. The boiler supplying steam at a working pressure of 160 lbs., and the engines making 112 revolutions a minute, it is estimated that the ship will develop a speed of 16 knots an hour. With her bunkers filled, and at a cruising speed of 10 knots an hour, she would be able to steam about 7,400 miles, while at full speed, under like conditions, she should be able to cover 3,000 miles and have a radius of endurance of six days. Nearly a hundred auxiliary engines will add to the efficiency of the ship.

The conning tower, of steel 10 inches thick, just beneath the pilot-house and behind and above the forward 12-inch turret, will be the fighting station for the captain, and through the armoured tube leading below there will be means of communication to every important station essential to his knowledge and control in action.

The small rapid-fire guns are mounted in a manner assuring the greatest sweep, and to them will fall the duty of repelling torpedo-boats, sweeping the decks of an enemy and driving from partly protected guns their working crews. The use of wood has been reduced wherever possible, and the major part of that used will be subjected to an electrical fireproofing process of tried efficiency.

In armour distribution, scope of fire, possible speed, power of battery, and sea-keeping qualities the ship is unexcelled abroad.

In regard to fittings to secure comfort for the officers and crew this ship does not differ materially from the coast-line battle-ships save in one particular, and that an important one, the additional accommodation for the crew afforded by the forecastle deck. This is a very valuable feature, particularly in tropical climates or when the ship's company may be augmented by the presence of prisoners or rescued fellow seamen. The contract offers a bonus to the contractors at the rate of $50,000 for every quarter of a knot over the required sixteen, and the accomplishments on other ships of the new Navy may fairly promise a good sized reward in the present instance.—*Army and Navy Journal.*

MILITARY NOTES.

PRINCIPAL PROMOTIONS AND APPOINTMENTS DURING MAY.

Colonel T. Fraser, C.B., C.M.G., R.E., to be Commandant, School of Military Engineering, with the temporary rank of Major-General; Lieut.-General E. F. Chapman, C.B., R.A., *p.s.c.*, to command the Scottish District; Colonel Coleridge Grove, C.B., to be Military Secretary, with the temporary rank of Major-General; Colonel Sir B. Blood, K.C.B., to command a second-class district in India, with the temporary rank of Brigadier-General; Major-General B. A. Combe, C.B., to command the troops at the Curragh; Colonel Hon. R. A. J. Talbot, C.B., A.D.C., to be a Major-General on the Staff, to command the Cavalry Brigade, Aldershot; Lieut.-General Sir H. Brackenbury, K.C.B., K.C.S.I., R.A., to be President, Ordnance Committee. Lieut.-General Sir G. R. Greaves, K.C.B., K.C.M.G., to be General; Colonel G. U. Prior, to be Major-General; Colonel (Brigadier-General) M. W. E. Josset, C.B., commanding a second-class district in India, to be Major-General; Colonel (temporary Major-General) J. B. Richardson, commanding R.A. Gibraltar, to be Major-General.

HOME.—The Secretary of State for War introduced in the House of Lords, on the 8th May, a Bill to amend the Reserve Forces Act of 1882. Under the existing military system, by which the majority of British soldiers enlist for twelve years, seven or eight of which they served with the colours and the remaining four or five years with the Reserve, the country has now, roughly, 80,000 Reservists, all trained men, who, whenever it has been found necessary to call them up for service, have invariably responded in the most satisfactory manner. In 1878 all the Reserve then existing were called up, and 13,684 responded out of a possible 14,154; and, in 1882, 11,642 men were summoned to the colours, and 11,032 reported themselves. The battalions of the Regular Army are linked in pairs, of which one is or should be abroad and the other at home. The foreign battalion is maintained at a standard of something over 1,000, while the home battalion might be taken at about 800, the recruits being kept at home until they are trained and fitted for service abroad. In the case of mobilisation the men of less than one year's service, and medically unfit for foreign service, would be sent to the depôt, and the whole battalion would be brought up to the proper strength by calling in a sufficient number of Army Reserve men, and would then compare very favourably indeed with the Service battalions of any foreign State. Clause 12 of the Reserve Forces Act of 1882, however, lays it down that the Government may call out the Reserve only in case of "imminent national danger or of great emergency"—words which are inapplicable to the sending out of an expeditionary force of 10,000 or 15,000 men. Whenever, therefore, it has been necessary to send out a force of those dimensions from this country, the authorities have found themselves face to face with the fact that the home battalions, taking them as they stand, are unfit for active employment abroad; and various vicious and universally condemned practices, such as drafting men from other battalions or forming composite battalions, have been resorted to. To meet the difficulty, therefore, it is proposed by the present Bill to increase the liability of the Army Reserve men in such a manner as to render a sufficient number of them available for service in circumstances that stopped short of the imminent national danger or great emer-

gency specified in the Act of 1882, as the condition without which the force could, not be called out for actual service. By making the men liable for compulsory service during their first year in the Reserve, the Government believe they will obtain the requisite number. Lord Lansdowne's view of the situation is that the home battalions are "feeders" for the battalions abroad, that Reserve men are an integral part of the first line of defence, and may be considered as belonging to the home battalions, but allowed on furlough. The Bill only applies to the men who enlist after it becomes law, but power is taken in the first clause to make use of Reserve men who consent in writing to accept the new liability.

It is intended to hold drills and manœuvres on an extensive scale in Ireland next month, for which the troops at Curragh Camp will form the nucleus. The drills, as distinct from manœuvres, will commence early in the month, when the Curragh command will be augmented by the arrival of the 2nd Battalion Hampshire Regiment from Birr, the 1st King's Own Light Infantry from Mullingar, and the 1st Lancashire Fusiliers from Athlone; also the 1st Royal Dragoons from Dublin. and probably the 14th Hussars from Cahir. The Infantry battalions are to start on the march to the Curragh at the end of July. The manœuvres—for the extra expense of which a sum of £6,000 has been allotted—will follow the drills, and will take place in the southern part of Queen's County. The Curragh troops—already increased as stated above—will be further augmented by three battalions from Dublin—the 1st Derbyshire, 1st Durham Light Infantry, and 2nd Royal West Kent; also the battalion stationed at Tipperary, and probably that at Kilkenny. Each of the Dublin battalions is to march at least 500 strong. The 28th Field Battery, at Athlone, and the 78th, at Longford, will go to the Curragh for both drills and manœuvres. Out of the amount granted for manœuvres provision has to be made for training a sick-bearer company and a field hospital, both mobilised as for home defence. The nucleus of the bearer company (No. 8) is to be supplied by the Cork Military District, and that of the field hospital (for a Cavalry Brigade) by the Belfast District; and both are to commence training on July 1st.

The fact of the institution of a new Indian Medal of 1895 may interest officers to know something about the two previous Indian Medals, and their accompanying clasps. The number of clasps in both cases is twenty-one. With regard to the Medal to the Army of India, 1799-1826, on the 14th April, 1851, the Governor General of India announced that the Queen had been graciously pleased to assent to the proposition of the Court of Directors of the East India Company, that a medal be struck and issued to the troops who took part in the following campaigns, battles, and sieges:—

1. Allighur, 1803.
2. Battle of Delhi, 1803.
3. Assaye, 1803.
4. Asserghur, 1803.
5. Laswarree, 1803.
6. Argaum, 1803.
7. Gawilghur, 1803.
8. Defence of Delhi, 1804.
9. Battle of Deig, 1804.
10. Capture of Deig, 1804.
11. Nepaul, 1816.
12. Kirkee, 1817.
13. Poonah, 1817.
14. Seetabuldee, 1817.
15. Kirkee and Poonah, 1817.
16. Nagpore, 1817.
17. Seetabuldee and Nagpore, 1817.
18. Maheidpore, 1817.
19. Corygaum, 1818.
20. Ava, 1824 to 1826.
21. Bhurtpore, 1826.

The greatest number of clasps issued on one medal was four. The Duke of Wellington received the medal with three bars for Assaye, Argaum, and Gawilghur. The medal, the ribbon of which is light blue, has on the obverse the head of the Queen, and on the reverse a figure of Victory, seated, and the date 1799-1826.

With the Indian General Service Medal of 1854 were issued twenty-one clasps. On 23rd January, 1854, the Queen sanctioned the issue of a medal "for the purpose of commemorating the services rendered during the operations against the Burmese" in 1852-53. It has since been known as the "Indian General

Service Medal," and was used as a reward for the incessant campaigns in India against the native tribes. The medal has, on the obverse, the head of the Queen, and on the reverse a figure of Victory. The ribbon is crimson, with dark blue edges. The clasps are :—

1. Pegu.
2. Persia.
3. North-West Frontier.
4. Umbeyla.
5. Bhootan.
6. Looshai.
7. Perak.
8. Jowaki, 1877-78.
9. Naga, 1879-80.
10. Burma, 1885-87.
11. Hazara, 1888.
12. Sikkim, 1888.
13. Burma, 1887-89.
14. Chin-Lushai, 1889-90.
15. Hazara, 1891.
16. Samana, 1891.
17. N.-E. Frontier, 1891.
18. Hunza, 1891.
19. Burma, 1889-92.
20. Lushai, 1889-92.
21. Waziristan, 1894-5.

The clasp for "North-West Frontier" was given for no fewer than eighteen frontier expeditions between the years 1849 and 1868. The following list shows the tribes against which these expeditions were undertaken :—

1. Villages of British and Independent Baizai, 1849.
2. Kohat Pass Afridis, 1850.
3. Mohmands (affair at Panjpao), 1852.
4. Ranizais, 1852.
5. Utman Khels, 1852.
6. Hassanzais, 1852-53.
7. Shiranis, 1853.
8. Kasranis, 1853.
9. Bori Afridis, 1853.
10. Michni Mohmands, 1854.
11. Aka Khel Afridis, 1855.
12. Villages of British Miranzai, 1855.
13. Bozdars, 1857.
14. Khudu Khels and Hindustani Fanatics, 1858.
15. Kabul Khel Waziris, 1859-60.
16. Mahsud Waziris, 1860.
17. Mohmands, 1864.
18. Black Mountain Tribes, 1868.

Army Order 100, of May, 1896, announces that the Queen has been pleased to approve of the Medal for Operations in Eastern and Central Africa being granted to the forces employed during April and May, 1895, in the Unyoro Expedition.

The Queen has sanctioned the issue of a special war medal by the Chartered Company of South Africa to commemorate the services of the officers and men who did duty in the Matabele War of 1894, and the necessary authority for the officers and men of the Regular Army and Militia to accept and wear the decoration will be given in an Army Order.

On the 20th and 21st May the Indian Contingent for service in Egypt, officially designated the "Suakin Force," left Bombay, and arrived at Suakin on the 30th and 31st May. The troops destined for Tokar sailed from Suakin for Trinkitat on the 30th May. The contingent consists of one Native Mountain Battery, one company of Sappers and Miners, one regiment of Native Cavalry, and two battalions of Native Infantry, under the command of Colonel, with the temporary rank of Brigadier-General, C. C. Egerton, D.S.O., Corps of Guides. The following is the detail :—

No. 5 Bombay Mountain Battery.
No. 1 Company Madras Sappers and Miners.
1st Bombay Lancers (Lieut.-Colonel E. L. Elliot, D.S.O.).
26th Punjab Infantry (Lieut.-Colonel L. Dening, D.S.O.).
35th Sikhs (Lieut.-Colonel T. H. Goldney).

With reference to a remark in the April number of the R.U.S.I. JOURNAL, in the review of the "New Cavalry Drill, 1896," the Editor is informed by Mr. Edward Stanford, Publisher, of 26, Cockspur Street, that the English translation of De Bienson's "Conduct of a Contact Squadron" has not been out of print since the date of its publication. It can still be obtained.

Army Order 107, of May, 1896, contains amendments of the Trumpet and Bugle Sounds, 1895, relating to camp and quarters calls and field calls. The following calls have been altered:—"Band," "Halt," "Commence Firing," "Cease Firing," "March at Ease, or Sit at Ease," "Advance," "Quick," "Double," "Attention."

AUSTRIA-HUNGARY.—On the 1st of June, Freiherr von Beck, the head of the Austrian General Staff, started with about fifty officers on a staff journey of eighteen days' duration. This is to be exclusive of the return journey to Vienna. The party went by rail for Cracow, whence the excursions will be made, and it is said that one of the objects of the expedition is to make arrangements for this year's grand manœuvres in Galicia.—*Militär-Zeitung*, 31. 5. 96.

There has been a certain reconstruction of the Hungarian Reserve Forces, which should not pass without notice; and the position taken up not only by the Landwehr, but also by the Landsturm, will add considerably to the strength of the first line. The Hungarian Landwehr has been decidely improved in almost every respect during the last twelve months, and it is now placed in a position, by means of its training, command, and distribution, to join the regular field army effectively when required to do so. The Landsturm has been in its turn advanced to take the place of the Landwehr in time of need. The old Honved infantry is certainly worthy of the additional attention which has been paid to it in the matters of transport and instruction, and, although the small addition of five lieutenant-colonels, four majors, and other officers to the permanent list, does not sound very important, there has, no doubt, been a well-considered and well-carried-out improvement in that old historic force.—*Militär-Zeitung*, 15. 5. 96.

FRANCE.—The following are some of the particulars of the organisation of the French Colonial Army. In France are the depôts of the infantry and of the colonial troops of discipline, line infantry from Algiers, and detached companies of light infantry battalions. In Algeria and Tunis are four infantry regiments of four battalions of four companies, of which two are French, four regiments of Algerian Tirailleurs of three battalions of four companies, two foreign regiments of four battalions of four companies, one battalion Sahara Tirailleurs of four companies, four battalions light infantry of five companies, and three fusilier companies of discipline.

In colonies and protectorates the recruiting is assisted from native sources, according to the several and differing circumstances of the place.

The cavalry in Algeria consists of four regiments of Chasseurs d'Afrique, of five squadrons each, four regiments of Spahis, and one squadron of Sahara Spahis. These regiments are officered by the Government of the mother country.

The colonial artillery has in France one depôt, five companies of artillery artificers, and field artillery from Algeria; in Algeria and Tunis, eight field batteries and two mountain batteries, and a regiment of four foot and six mountain batteries, four companies of artillery artificers, and six companies of drivers per train. There are subsidiary services of which it is hardly necessary to make mention.—*Deutsche Heeres-Zeitung*, 2. 5. 96.

Captain H. H. Wigram, *p.s.c.*, Scots Guards, has prepared, for the Intelligence Division of the War Office, a *précis* of the French Musketry Regulations of 1895, which substitutes an entirely new system for that previously in use. The rifle is the Lebel, 1886. Its maximum range is 3,500 yards; a bullet is liable to ricochet up to 2,200 yards, and a ricochet from a point 1,600 yards from the firing point is dangerous up to 2,400 yards. The culminating points of the trajectory are: at 500 yards, 4 feet 6 inches; at 1,000 yards, 32 feet; at 1,500 yards, 103 feet; at 2,000 yards, 247 feet. The trajectory up to 200 yards is practically flat, the culminating point being 4 inches.

In each battalion a captain, designated the musketry captain, assisted by a subaltern, superintends the musketry; and the two officers perform many of the duties discharged in the British Service by the assistant adjutant. Each company has a musketry sergeant. The course of theoretical instruction closely resembles the British. Judging distance is taught to all ranks up to 600 yards, and to commissioned and non-commissioned officers up to 1,200 yards, after having undergone a preliminary course of instruction. The Goulier, rather a complicated instrument, is superseding the Labbez telemeter previously in use in the French Army. It consists of a double-reflecting prism and a series of lenses of curious construction. It works with a normal base of 20 metres, and is used somewhat after the manner of the Weldon range-finder.

Before commencing target practice on the range, a practice similar to the Morris tube is carried out, with 150 rounds, in individual practice at stationary, moving, and vanishing targets, rapid firing, individual firing by word of command, and volley firing. The trained soldier is allowed 120 rounds per annum. Individual practice is carried out in drill order; other practices in drill order with the pack: practices at unknown distances in marching order. After the completion of the *tirs d'instruction*, which consists of forty-two rounds at distances between 100 and 400 yards in different positions and with different sized targets, the soldier enters upon a course of instruction intended to enable him to make intelligent use of his weapon in the field of battle. He is shown targets such as he may be expected to find in the field; he is taught to make intelligent use of cover, to estimate distance and adjust his sight; is put through volley firing and finally field firing.

The *tirs d'application* consists of forty-four rounds at dummies at various distances between 200 and 600 yards; but no man is allowed to take part in it until he has made at least twenty-five in the *tirs d'instruction*. All officers below the rank of captain fire with their companies, but with captains it is optional. The *tirs de combat individuels* are carried out against parties of men who are in advance or retreat, are taking cover behind trees or hedges, etc. The soldier is taught to avail himself of natural cover, and to utilise any support which he may find near him to steady his rifle or support his hand. The *feux collectifs* are executed similarly to the corresponding practices in the British Service. They consist of section volleys at dummies at 800 and 1,000 yards, fourteen rounds being expended, and twenty rounds at dummies between 200 and 900 yards, individual fire advancing, between 600 and 900 yards, rapid at 350 yards, and eight rounds in thirty seconds, magazine time, at 200 yards.

Field firing is carried out at unknown distances by the whole company. The lessons which they are intended to enforce are: 1. The rapid opening of fire on a given objective. 2. Changes in the direction of the fire during an engagement. 3. Changes in the nature of the fire. 4. Control of the fire. The company acts precisely as if in the field, and is preceded by its scouts up to a distance from the front line of the objectives of between 1,000 and 2,000 yards, according to the nature of the ground. Each practice is preceded by a march, or other manœuvre, so as to assimilate the conditions as far as possible to those of actual warfare.

All officers, staff sergeants, bandsmen, and men connected with regimental transport are instructed in the use of the revolver, and they fire thirty-six rounds at 15 and 30 yards.

Captain Wigram's translation gives much other information which is worthy of study.

The French system of musketry instruction seems well adapted to the conditions of service in their active Army. Most of the points of difference between it and the British appear due to the necessity for carrying out the education of the recruit at the same time as that of the trained soldier. The method of conducting the individual practices does not seem calculated to produce in a soldier full confidence in his unaided capacity to make full use of his rifle, as the elevation and

allowance necessary are found for him and kept constantly before his eyes during the practices, a method tending to produce a higher figure of merit than that really due to the sum of the individual capacities of the company. The collective practices resemble the British so closely as to require no special notice, and the field firing is practically essential with that in the British Army. The general result of the new method must be to throw the responsibility for the musketry efficiency of the company on the captain to an extent which has never hitherto been the case, while, at the same time, he is given a power of initiative and a control over the execution of the various practices which enormously strengthens his hands. The new French regulations, viewed as a system of instruction in musketry for war purposes, are probably as nearly perfect as can well be devised.

GERMANY.—On the 18th May, General Bronsart von Schellendorff, the Prussian Minister of War, introduced in the Reichstag the Bill for the re-organisation of the 4th battalions of the infantry regiments. These 4th battalions, created in 1893, were intended to act as a training depôt, and also to relieve the senior battalions of various routine duties, so as to afford them more time for practical training in the field. A full description of the Army Bill, under which the 4th battalions were raised, is given on page 1,255 of the JOURNAL of the R.U.S. Institution for 1893. The strength of the new battalions was fixed at 193—a number so small that it has been found unworkable, for after deducting the men struck off for daily duties there were not enough left for systematic tactical training. No fewer than 15,093 men were yearly passed into the Reserve imperfectly educated, according to the high German standard of excellence; and to remedy this evil it is proposed to link these small battalions together by pairs, and to raise their numbers to 500 men, by levying contributions from the other battalions of the two regiments from which they are to be created. The enlarged 4th battalions are to be formed into regiments and brigades, and to each will be allotted the proper *quota* of Reserve officers and men. By this means the Military Authorities expect to add to the fighting strength of their Army a force rather larger than the whole of the British Regular forces which serve in time of peace in the United Kingdom. The expenditure necessitated by the re-organisation, which will raise the number of battalions in the Army to 624, is considerable. The Army Bill of 1896 is to come into force on April 1st, 1897.—*Revue du Cercle Militaire*, 23. 5. 96.

ITALY.—The *précis* of the Italian Musketry Regulations, 1895, prepared by Captain H. H. Wigram, *p.s.c.*, Scots Guards, for the Intelligence Division, affords ground for much interesting study. The Italian rifle is a magazine arm with bolt action. The magazine cannot be detached, and the arm as a rule is not to be used as a single-loader. When it is required to load, the breech is opened, a clip containing six cartridges is pushed bodily down into the magazine, and on closing the action the top cartridge is carried forward into the chamber, and the rifle is ready for firing. The weight of the rifle without the bayonet is 8 lbs. 6 ozs., while with the bayonet fixed it weighs 9 lbs. 2 ozs. There are three kinds of cartridge: 1. The Service ball cartridge. 2. The blank cartridge with paper bullet, and 3. The drill dummy cartridge. In peace-time 90 rounds are issued to each man, and kept in the knapsack. In time of war the allowance is 162 rounds, 90 rounds in the knapsack, and 72 rounds in the pouch.

The recruit, after being taught the manual exercise and method of handling the rifle with the dummy cartridges, is instructed in loading and firing with blank; 12 rounds are expended in various positions with different sights; 6 rounds are fired at a disappearing target; 6 rounds lying down, with bayonet fixed, as rapidly as possible, consistent with preserving the aim; and 12 rounds in collective practices. In war-time, the recruit generally finds himself under the orders of a superior

officer in regard to the range and the nature of the fire to be delivered; but when thrown on his own resources he has five rules to bear in mind:—1. Never to fire at a man lying down beyond 300 yards. 2. Never to fire at a man kneeling beyond 400 yards. 3. Never to fire at a man standing or on horseback beyond 500 yards. 4. To use the correct sight for the range, and to employ the lowest elevation against a mounted man at all ranges, aiming at the centre of the object; and 5. In the case of an objective stationary or advancing, or retiring directly, always to aim directly at the centre unless when firing down hill; in this case, to aim at the foot; in the case of an object crossing the line of fire, to aim at the edge nearest the flank to which it is moving.

The judging distance practice for recruits and trained soldiers is considered of great importance. Recruits judge distances up to 700 yards along a straight road, on level ground, on rising ground, and on falling ground. If a recruit does not arrive at a certain standard of efficiency, he passes into a class which is exercised during the whole of his stay with the colours; but it is not thought worth while to waste time in the further instruction of those who do not come up to a reasonable standard. The instruction of the trained soldiers is carefully looked to, and he judges up to 2,000 yards. The recruits' course of musketry consists of 30 rounds; 6 rounds at 100 yards, two standing, two kneeling, and two lying down; 6 rounds rapid standing at disappearing target at 100 yards; 6 rounds independent firing kneeling at 100 yards and 6 rounds at 200 yards; and 6 rounds rapid lying down at 200 yards. On the completion of this course the recruit is mixed up with the trained soldier, and the two classes execute the following course:—At 200 yards, ordinary individual fire, standing, kneeling, kneeling with bayonet fixed, any position, and lying down with bayonet fixed. Then follow individual field practices at 400, 450, and 800 yards (dummies); collective practices, and field-firing in tactical formation.

In the instruction of the recruit the first feature which attracts attention is the large number of rounds of blank ammunition expended before target practice commences; no equivalent for either the Morris tube practice, or the *tir réduit* of the French, being provided. The exclusion of men from further instruction who have shown themselves unlikely to become efficient judges of distance, is a practical feature which is worthy of note. The training also appears calculated to establish and keep up the habit of readily and accurately estimating ranges. The regulations for the conduct of target practice do not seem as well calculated to promote a high standard of individual marksmanship as those of the British Army, as the firer, who only becomes aware of the position of his shots at the conclusion of his practice, can hardly be expected to take as keen an interest as the man who has the opportunity of seeing and correcting his errors. Why such a system should have been adopted does not seem very clear, as no special economy in time or money seems likely to result from it. In the target practice, the habit inculcated of aiming at the centre of the mark instead of, as in most Services, at the foot of it, requires an explanation which is not forthcoming. The preliminary firing in the recruits' course is hardly sufficient to prepare the soldier for the more extended practices which he almost immediately has to commence in the trained soldiers' course, merely 30 rounds being fired, as against 159 in the British Service. Great stress is laid on the collective practices, which are really a series of exercises in field firing carried on by units growing progressively larger until they culminate in exercises performed by all arms, under Service conditions. Judging by the British system, the training of the Italian individual soldier in practical musketry is somewhat perfunctory, and a portion of the ammunition expended in the collective practices might, with advantage, be devoted to further individual instruction at longer ranges.

The estimated loss of Italy in the battle of Adowa, including that of the native levies is put at 10,000 men killed. Of five generals, two (Arimondi and Dubormida) are dead; and of the two who escaped, Generals Baratieri and Ellena

the latter is seriously wounded. Of seven colonels, two (Airighi and Romoro) are dead, while one (Rava) is a prisoner, and four (Valenzano, Brusati, Stevani and Ragin) have returned to Asmara. Fifteen majors out of twenty-four have been killed, and out of 9,000 Italians of the rank and file, 3,400 only, of whom 400 are prisoners, escaped the slaughter. The remainder of the losses are among the native troops. General Ellena, who lies wounded in a military hospital, says it was fatuous to take into such an engagement an Army as badly organised, ill-disciplined, and imperfectly provided as can be imagined. The plan of attack could not have been worse. There were no maps and, save a few subalterns, no one knew the *terrain*, with the result that the three columns were so far separated that united action was impossible. What was done notwithstanding, says the General, was truly miraculous.—*Italia Militare.*

RUSSIA.—It is stated in the *Invalide Russe* that the last grand manœuvres and officers' drill journeys in the St. Petersburg military district were satisfactorily carried out. The operations lasted ten days, and were attended by seventy-nine superior officers. There was also an officers' fortress drill under the Commandant of Kronstadt, in which two generals, two staff officers, and twenty-six superior officers took part. The drills lasted twelve days. In addition to the above, a ten days' manœuvre of engineer officers was held with satisfactory results in the same district.—*Militär-Zeitung*, 7. 5. 96.

SPAIN.—A new arrangement has been made in the Spanish Field Artillery, whereby the present 4th Regiment is now styled a "light artillery regiment," and consists of two horse batteries and two mountain batteries. It is officered by a colonel, a lieut.-colonel, three majors, three captains, a doctor, a chaplain, two veterinary surgeons, and a riding-master. Each horse battery has the following strength:—One captain, three first lieutenants, three sergeants, eight corporals, two trumpeters, ninety-one gunners, four officers' horses, fifty riding and fifty harness horses. The following is the strength of the mountain battery:—One captain, three first lieutenants, three sergeants, eight corporals, two trumpeters, eighty-two gunners, four officers' horses, fourteen riding and fifty harness horses or mules. The field artillery regiments, numbered from 5 to 14, have four batteries of eight 8-centimetre Placentia guns each; the guns of the regiments numbered from 1 to 5 having 9-centimetre guns on the same system.—*Militär-Wochenblatt*, 28. 3. 96.

NAVAL AND MILITARY CALENDAR.

MAY, 1896.

1st	(F).	Shah of Persia assassinated near Teheran.
,,	,,	Small mounted Dervish force defeated near Akasheh by 3 squadrons of Egyptian cavalry and 11th Soudanese Battalion under Major J. F. Burn-Murdoch, 1st Dragoons.
,,	,,	Spanish troops successful in attack on entrenched position of Cuban rebels in the Vuelta Abajo district.
2nd	(Sat).	Further detachment of 3 companies of Mounted Infantry Regiment left England for S. Africa.
,,	,,	Troop of 60 Volunteer Mounted Infantry, raised in Natal for service under Chartered Company in Rhodesia, left Durban for Matabeleland.
,,	,,	100 British and American Marines landed and occupied Corinto, Nicaragua, for protection of life and property.
3rd	(S).	300 of 7th Hussars under Lieut.-Colonel H. Paget, and 150 Mounted Infantry under Major P. T. Rivett-Carnac, 2nd W. Riding Regt., left Natal for Matabeleland.

5th (Tu). H.M.S. "Trafalgar" recommissioned at Malta.

,, ,, 1st Bn. Leicestershire Regt. arrived at Petermaritzburg from Cape Town to replace troops sent to Matabeleland.

6th (W). Unsuccessful attack on Loyal Induna Maznai, 20 miles south of Buluwayo, by Matabele Impi.

8th (F). Bill to amend the "Reserve Forces Act, 1882," introduced in House of Lords by Secretary of State for War.

9th (Sat). Matebeles driven from Morene and surrounding kraals by Salisbury column.

12th (Tu). Launch of armoured cruiser "Rossia" from the New Admiralty Yard, St. Petersburg; and coast-defence battle-ship "General-Admiral Apraxin" from the Baltic Yard, St. Petersburg, for the Russian Navy.

,, ,, Remnant of French Expedition, which was routed in the Borgu country, West Africa, left Kiama for Lagos.

15th (F). Colonel Sir R. Martin, and Colonel Plumer, D.S.O., arrived at Buluwayo.

,, ,, Matabeles on other side of the Thabis Induna who threatened communication with Salisbury routed.

16th (Sat). Launch of torpedo-boat destroyer "Sante Fé," from Messrs. Yarrow's yard, Poplar, for the Argentine Government.

17th (S). Turkish garrison of Vamos, Crete, besieged by insurgents.

18th (M). Launch of torpedo-boat destroyer "Teniente Serrano," for the Chilian Government, from Messrs. Laird's works at Birkenhead.

,, ,, Major-General Sir F. Carrington left Cape Town for Buluwayo to assume command in Matabeleland.

,, ,, Fort of Adigrat evacuated by Italian troops, and, after cannon had been destroyed and ammunition exploded, handed over to the Abyssinians.

,, ,, 1st Bn. Middlesex Regt. arrived at Cape Town from England.

21st (Th). 1st Bn. Scots Guards arrived at Wellington and Kensington Barracks from Pirbright; 1st Bn. Coldstream Guards arrived at Pirbright from Wellington Barracks.

,, ,, First portion of Indian contingent under Colonel and Brigadier-General C. C. Egerton, C.B., D.S.O., left Bombay for Suakin and Tokar.

,, ,, Junction of Mr. Cecil Rhodes, Salisbury column and Colonel Napier's Buluwayo column, near Shanghani river.

,, ,, Unsuccessful attempt of Turkish troops to relieve garrison of Vamos, in Crete.

22nd (F). Remainder of Indian contingent left Bombay for Suakin and Tokar.

25th (M). Launch of armoured cruiser "San Marten" at Leghorn, for Argentine Government.

,, ,, Matabele driven from Crewe's Farm, 5 miles N.W. of Buluwayo, by Colonel Plumer's column from the town. British loss, 1 killed; 3 severely wounded.

26th (Tu). Launch of second-class cruiser "Arrogant" at Devonport.

,, ,, Matabele defeated by Colonel Plumer, 8 miles from Umgusa river. British loss, 3 killed.

,, ,, Action between Colonel Napier and Matabeles near Insezi river. British loss, 2 killed, 3 wounded.

,, ,, Cuban Revolt. Rebels defeated near Consolacion, Havana, by Spanish column under General Valdes.

27th (W). Launch of the second-class cruiser "Cassard" at Cherbourg, for French Navy.

28th (Th). H.M.S. "Scylla" commissioned at Chatham for Mediterranean.

30th (Sat). Indian troops arrived Suakin, and sailed next day for Trinkitat (for Tokar).

,, ,, Successful relief of Turkish garrison of Vamos, in Crete.

31st (S). Second portion of Indian troops arrived at Suakin.

FOREIGN PERIODICALS.

NAVAL.

ARGENTINE REPUBLIC.—*Boletin del Centro Naval.* Buenos-Aires: April and May, 1896.—Not received up to time of going to press.

AUSTRIA-HUNGARY.—*Mittheilungen aus dem Gebiete des Seewesens.* No. 6. Pola and Vienna: June, 1896.—"The Brown Wire System for Guns." "Foreign Navies in 1895." "The Italian First-class Battle-ships." "Canet's Gun-turrets with the Electric Fittings." "The Holland Submarine Boat." "German Naval Estimates for 1896-97." "Foreign Naval Notes." "Book Notices."

FRANCE.—*Revue Maritime.* Paris: May, 1896.—"Notes on the Deviation, Regulation, and Compensation of the Compass." "A New Telemetre giving at a glance the Height of Mastheads." "Experiments to test the Gyratory Effect of the Screw." "Seamen's Maladies and Naval Epidemics" (*continued*). "Foreign Naval Chronicle." "The Maritime Fisheries."

La Marine Française. Paris: 10th May, 1896.—"Naval Flotillas." "The German Squadron in the Helder." "The Organisation of the Supreme Command of the Forces." "Home and Foreign Naval Notes." "Foreign Seaborne Commerce: Notes to Serve as a Preparation for a Cruiser War." 25th May.—"The Cruisers of the 'Bugeaud' Type." "The Ruelle Factories and the Construction of Naval Guns." "Home and Foreign Naval Notes." "Yachting Notes." "Seaborne Foreign Commerce: Notes to Serve as a Preparation for a Cruiser War" (*continued*).

La Yacht. Paris: 2nd May, 1896.—"The Administrators of the 'Inscription Maritime.'" "Yachting Notes and News" (with plans and photographs). "Launch of the First-class Battle-ship 'Bouvet.'" "Home, Foreign, and Mercantile Naval Notes." 9th May.—"The Transformation of the 'Foudre.'" "The Laying down of Ships-of-War." "The Russian Fleet in 1896." "The New Four-master 'President Félix Faure'" (with photograph). "Home and Foreign Naval Notes." 16th May.—"The Naval Annual for 1896." "Yachting Notes" (plans and photograph). "Meeting of the Maritime Technical Association: Lecture—Application of the De Laval Turbine to the Navy." "Naval Notes, Home and Foreign." 23rd May.—"The Problem of the Fighting-ship." "Yachting Notes and the Regattas." "The Battle-ship 'Redoubtable'" (with photograph). "Naval Notes, Home and Foreign." 30th May.—"Petroleum Fuel." "Official Trials of the First-class Battle-ship 'Jauréguiberry.'" "The Mediterranean Squadron and the new Port of Biserta" (with photographs). "Naval Notes, Home and Foreign." "Progress of the Japanese Mercantile Marine."

Le Moniteur de la Flotte. Paris: 2nd May, 1896.—"The New Minister of Marine." "Submarine Boats" (*concluded*). 9th May.—"Plates and Projectiles." "Colonial Notes." 16th May.—"The Wharf at Majunga." "The Naval School: Session of 1896." 23rd May.—"The School of Fishery." "Vice-Admirals Layrle and Des Portes: Obituary Notices." "Colonial Notes: the Upper Mekong." 31st May.—"The Officer and the Seaman." "Re-organisation of the Central Administration." "Colonial Notes."

GERMANY.—*Marine Rundschau.* Berlin: June, 1896.—"Impressions of German East-Africa" (with photographs.) "On Infection on board ship through the use of Poisonous and Deleterious Food." "Peculiarities of Aluminium and its

Employment for Engines and in the Construction of Ships." "The Battle of Trafalgar, from a Spanish source" (*continued*). "Foreign Naval Notes." "An Aluminium Projectile." "The Effect of Bullets from Small-calibre Weapons." "Book Notices."

ITALY.—*Rivista Marittima.* Rome: May, 1896.—"The Regulations for the Mercantile Marine." "Combustion Measurers: Application to Marine Boilers." "Determination of the Time by means of Stellar Observations in the Vertical of the Pole." "On the Employment of Artillery in Naval Actions." "The War Navy of the Grand Dukes di Medici" (*continued*), by C. Manfroni. "Letter to the Director." "The Mercantile Marine in France," by A. V. Vecchj. "Foreign Naval Notes." "Mercantile Marine:—Natural selection of ships; Administration in France; Italian Sanitary Regulations; The Trieste—Fiume—Dunkerque Line." "Various Notices:—War-ship Machinery in England; The Problem of Two Position Circles or of Sumner, Solved Graphically by Stereographic Tangents." "Notices of Books:—Mechanism of Men-of-War; Naval Pocket-Book." "Supplement:—On the Naval Organisations of the Principal Nations—Greece."

L'Osservatore Navale. Palmero: May, 1896.—Not received up to time of going to press.

SPAIN.—*Revista General de Marina.* Madrid: May, 1896.—"Squadron Tactics." "On Torpedo-boats." "Day Attacks by Torpedo-boats." "Tactical Employment of Torpedo-boats." "The Battle of the Yalu and its Effect on the Construction of Ships-of-War." "Composition of Squadrons." "The Navy of the United States." "The French Naval Higher School of War." "Submarine Mines and the Defence of the English Coasts." "The Institute of Naval Architects." "The Effect of fire from Ships on Fortifications." "Vocabulary of Powders and Modern Explosives" (*continued*). "Foreign Naval Notes."

SWEDEN.—*Tidskrift i Sjöväsendet.* No. 2. "The Year's Report on Ship-building and Machinery" (*continued*). "The Armament of War-ships." "The Homogeneity of the Fleet."

MILITARY.

AUSTRIA-HUNGARY.—*Organ der Militär Wissenschaftlichen Vereine.* No. 4. Vienna: April, 1896.—"On the Reciprocal Study of the Three Arms of the Service by their respective Officers." "Some Remarks on the Latest Advances in Photography and the Modern Processes of Reproducing." "The Roumanian Military Literature of 1895." "Book Notices."

Militär-Zeitung. Vienna: 7th May, 1896.—"On the May Promotions." "The Events in North-East Africa up to 27th April, 1896." 15th May.—"The Hungarian Landwehr." "The Events in North-East Africa up to the 27th April, 1896" (*concluded*). 21st May.—"The Arch-Duke Charles Louis: Obituary Notice." "The Meeting of the Delegations." 31st May.—"Feld-Zeugmeister Franz Freiherr von Kuhn: Obituary Notice." "The New Pension-Law for State Officials." "The Race Meetings and the Prizes."

Mittheilungen über Gegenstände des Artillerie- und Geniewesens. No. 5. Vienna: 1896.—Not received up to time of going to press.

FRANCE.—*Revue du Cercle Militaire.* Paris: 9th May, 1896.—"The Italians in Erythrea." "The Art of Commanding" (*continued*). "War in Spain, 1808-1814." "Memoirs of a Surgeon under the First Empire." 16th May.—"The first English Campaign in Matabeleland." "The Art of Commanding" (*continued*).

23rd May.—"The Spanish Military Annual for 1896." "The Art of Commanding" (*concluded*). 30th May.—"Practical Instructions for Artillery in France and Germany." "The Spanish Military Annual for 1896." "Instruction of Italian Reserve Infantry Officers."

Le Spectateur Militaire. Paris: 1st May, 1896.—"Our Shields," by Léonce Brun. "Studies in Applied Tactics at Le Bourget," by Pierre Lehautcour. "Organisation of High Commands by Boissonnais," by Noel Desmaysons. 15th May.—"Q.F. Guns for Field Artillery," by Colonel Shabert. "Our Shields," by Léonce Brun (*continued*).

Revue de l'Intendance. May, 1896.—"Analysis of French and Foreign Oats." "The Materials of Military Uniforms." "Cattle in Hot Climates."

Revue de Génie. May, 1896.—"Three Balloon Ascents in 1895," by Captain Bouttieaux.

Revue d'Artillerie. Paris: May, 1896.—"Field Shrapnel and the Cannon of the Future," by Jeannel. "Electric Search-Lights in Warfare," by Bochet. "New Russian Instructions for the Fire of Massed Batteries," by Pollin.

Revue des Sciences Militaires. Paris: May, 1896.—"The Strategy of the Battle-field, A Battle lasting several days, The First Night Reinforcements, Field-works, Continuation of the Combat," by General Lewal. "La Guerre et la Paix," by Tolstoi, discussed by General Dragomiroff. "Infantry Fighting Tactics," by Barrés. "Infantry Scouts," by Schmidt.

Revue Militaire de l'Étranger. Paris: May, 1896.—"The Present Tendency of the German Infantry." "The Italians in Africa." "The Military Organisation of Greece."

Revue de Cavalerie. Paris: May, 1895.—"Essay on Practical Instruction of the Cavalry Cadres." "From Lützen to Bautzen" (*continued*). "The Divisional Cavalry. "Cavalry in front of an Army." "Old Regiments of Hussars" (*continued*).

GERMANY. *Militär-Wochenblatt.* Berlin: 2nd May, 1896.—"Military News from Russia." 6th May.—"Hints on the playing of War Games." "Four or Six Guns?" 9th May.—"The Memorial Festival of the Veterans of the Field-Railway Department in the War of 1870-71." "A Reminiscence of the Battle of Noisseville." "The Transport of the Remounts for the Amur Territory." 13th May.—"Professor Heinrich von Treitschke: Obituary Notice." "Moltke's Military Correspondence, 1870-71." "The *Personnel* of the Fortress Construction Corps." 16th May.—"Von Löbell's Annual Report on the Changes and Progress in Military Matters." "The United States Naval Estimates for 1896-97." "The Promotion of One-Year Volunteers in the Austro-Hungarian Army to Reserve Officers." 20th May.—"A Correction of Moltke's Military Correspondence, 1870-71." "The Storming of Chambord Castle on 9th December, 1870" (with a sketch). 23rd May.—"Whitsuntide." "The Prussian and Würtemburg Army Lists for 1896." "The Effective Firing of Infantry and Field Artillery." "Military News from Australia." 27th May.—"The Bavarian Army List for 1896." "The Field-gun Question." "New Pension and Age Regulations for Officers in the Norwegian Army and Navy." 30th May.—"Psychical Suggestions in Military Life." "The English Mounted Infantry."

Deutsche Heeres-Zeitung. Berlin: 2nd May, 1896.—"Lessons from the Battle of the Yalu." "The Landing of Expeditions sent by Sea" (*continued*). 6th May.—"Automatic Hand-Fire Arms." "The Landing of Expeditions sent by Sea" (*concluded*). 9th May.—"How can we Increase the Efficiency of the Education of our Infantry and its Leaders?" "Anti-Machiavelli." 13th May.—"An Italian Work on Moltke." "Anti-Machiavelli" (*concluded*). 16th May.—"The Operations of Napoleon in 1805 to the Capitulation of Ulm." 20th May.—"The French Army

before the War of 1870." "The Operations of Napoleon in 1805 to the Capitulation of Ulm" (*continued*). 23rd May.—"The French Government and the Management of the Army before the War of 1870." "The Operations of Napoleon in 1805 to the Capitulation of Ulm" (*concluded*). 27th May.—"The French Army after its Defeats of 1870-71." "Portable Bicycles for War Purposes." 30th May.—"The French Reserves and Territorial Officers." "Portable Bicycles for War Purposes" (*continued*).

Jahrbücher für die deutsche Armee und Marine. No. 5. Berlin: May, 1896.—Not received up to time of going to press.

Neue Militärische Blätter. Berlin: May, 1896.—Not received up to time of going to press.

ITALY.—*Rivista di Artiglieria e Genio.* Rome: April, 1896.—"On a Contribution to the Rational Solution of the Ballistic Problem." "The walls for the 57-millimetre (2·3-inch) shrapnel." "The Crehore and Spicer Photocronograph." "An Automatic Friction Clutch." "The New Battle Regulations for the Field Artillery of Germany and Austria." "Miscellaneous Notes." "Foreign Military Notes."

RUSSIA.—*Voénnii Sbórnik.* St. Petersburg: May, 1896.—Not received up to time of going to press.

SPAIN.—*Memorial de Ingenieros del Ejército.* No. 4. Madrid: April, 1896.—"Transport Material for the Units of the Railway Battalion." "The Use of our Network of Railways in War" (*concluded*). "Enclavamientos." "The Röntgen Rays." "Military and Scientific Notes."

Revista Técnica de Infantería y Caballería. Madrid: 1st May, 1896.—"Swiss Military Institutions" (*continued*). "The Wars in the Low Countries—The Siege and Surrender of Breda, 1624-25" (*continued*). "Some Points in the History of the Military Institutions of the United States" (*continued*). "War in the Future." "Episodes in the Cuban Insurrection." 15th May.—"Swiss Military Institutions" (*continued*). "The Wars in the Low Countries—The Siege and Surrender of Breda, 1624-25" (*continued*). "Some Points in the History of the Military Institutions of the United States" (*continued*). "General Santelices y Velasco: Obituary Notice." "The Infantry Soldier in Modern War."

SWITZERLAND.—*Revue Militaire Suisse.* Lausanne: 15th May, 1896.—"The Strategic Deployment of the French Forces on their Eastern Frontier. "The War in Eyrthrea." "Manœuvres of the 1st Army-Corps in 1895."

UNITED STATES.—*Journal of the U.S. Artillery.* Fort Monroe, Virginia: March-April, 1896.—"Tests of the Pneumatic Torpedo Gun at Shoeburyness." "Sea Coast Defences and the Organisation of our Sea Coast Artillery Forces." "Present State of the Struggle between Armour and Artillery. "A Proposed System of Harbour Defence." "Sea Coast Artillery Instruction." "Range Table for the 10-inch B.L. Rifle, Steel." "The Bicycle and its adaptability to Military Purposes." "Professional Notes."

The United Service. Philadelphia: May, 1896.—"The Defence of our Maritime Frontiers." "A Forward Step towards Bi-metallism." "A Contemporary of Saladin." "The Battalion of Engineers, U.S. Army." "The Battle of Sadowa." "The Great War with Russia."

Journal of the Military Service Institution. "Governor's Island: May, 1896." "The Army in time of peace." "The School at Fort Riley." "The Sioux Campaign of 1890-91." "Light Artillery Horses." "Military Aeronautics." "Target Practice of Armies of Europe." "Some Great Commanders of History."

NOTICES OF BOOKS.

The Naval Annual, 1896. By T. A. BRASSEY. Portsmouth and London: Griffin and Co. Price, 12s. 6d.

The new edition of the "Annual" is, in many respects, the best which has yet appeared, and the Editor, and those associated with him in its compilation, may justly be congratulated on their work. As in previous years, the "Annual" is divided into four parts. Part I. consists of contributions by the Editor, M. Weyl, Jack La Bolina, Commander Bacon, Captain Orde Browne, and Messrs. Dunell and Gleig. M. Weyl, the well-known French naval writer, gives his interesting review of the "Progress of Foreign Navies," which has become one of the most valuable features of the book; and he has further this year added a paper on the "French Navy," which, in a concise form, contains much useful information. The well-known writer who signs himself Jack La Bolina contributes an equally interesting chapter on the "Italian Navy." The Editor himself contributes papers on the "Progress of the British Navy," "Relative Strength," the "Naval Gathering at Kiel," and that much-vexed question "Manning"; they are all carefully written, and worth reading. In regard to the "Manning" question, Mr. Brassey has apparently given up the impracticable idea of creating a Reserve by means of a system of short service in the Navy for men specially entered for this purpose; he revives, however, Lord Brassey's suggestion, made some years ago, that ship-owners should be encouraged to enter apprentices under an engagement at the end of their four years' apprenticeship to do a year's training in the Navy, and then to join the Reserve, Government paying a premium to the shipowner of £20 for each apprentice, and a gratuity of £15 to the recruit on his joining the Navy for his year's training. Some such scheme is undoubtedly well worthy of consideration by the authorities, and would soon lead to a sensible increase of the Reserve by men who would have received a thorough grounding in drill and the duties on board a man-of-war, which knowledge could be kept up by the inauguration of a proper system of calling out the Reserves for training; while, on the other hand, the mercantile marine would also greatly benefit by obtaining a better class of men than the bulk of the merchant seamen are at the present day. Mr. Brassey's suggestions as to the Colonies being invited to co-operate in forming Naval Reserves are also good. The other chapters in Part I., although of interest, and, as far as the manœuvres are concerned, useful for purposes of reference, do not call for any special comment; Chapter VIII. however on "British and Foreign War-ship Construction," the joint work of the Editor and Captain Orde Browne, contains some interesting diagrams showing the gun-power of representative types calculated by total energy of fire discharged per minute.

Commander Robinson, who this year has had the work of bringing the Tables in Part II. up to date, has completed his arduous work with great care, and has further added very useful Comparative Tables of British, French, Russian, Italian, and German ships. The plates of ships have also been carefully revised, and some glaring errors which appeared in previous issues of the "Annual" have been rectified.

Part III. on Armour and Ordnance, the work of Captain Orde Browne, is as usual, although concise, full of valuable and interesting matter.

Part IV. is made up of Official Statements and *Précis* of the Naval Estimates of England and the principal European Powers.

The numerous illustrations of ships are particularly good, and, taking the Annual" as a whole, the Editor must be congratulated on having this year produced the most correct and valuable edition which has appeared since it was first published.

Life and Letters of the late Admiral Sir Bartholomew James Sulivan, K.C.B., 1810-90. Edited by his son HENRY NORTON SULIVAN. London: John Murray, 1896.

In the book now under notice the public have not only an excellent biography, but also a contribution to naval literature of distinct utility, and this for two reasons. Firstly, we have portrayed in it the career of a man who is typical of that stamp of which the Navy has produced so many, and the production of which has been no small cause in making the Service the pride of the country. Sulivan is a type of those who, without interest, have, by dint of merit and sheer hard work, gained for themselves a recognition of their capabilities and a thorough—if in many cases a somewhat tardy—appreciation of their worth. His career readers can follow for themselves in the pages of his biography, and in so doing they will realise what the Navy owes to the surveying branch of the Service. From lieutenant of the "Beagle" in her world-renowned cruise, to surveying captain of the fleet operating in the Baltic during the Russian war, the whole record of Sulivan's career is one that is marvellously instructive of what a good man can do in the special branch of the Service to which the subject of this biography devoted himself from the outset. Secondly, the book gives us the most detailed account as yet published of a series of operations carried out by the Navy, of which many, even amongst those fairly well read in naval history, have but a meagre knowledge. We refer to the Parana campaign and the forcing of the defences of that river at Obligado, and the preceding and subsequent operations in the estuary of the River Plate, on the Uruguay, and on the Parana. This portion of the work is of exceptional interest, and in itself alone will render the book one of value to students of naval history.

Wanderungen über die Schlachtfelder von Saarbrücken und von Metz. By Major HERRMANN KUNZ. Berlin: Eisenschmidt. (Paper $8\frac{3}{4}'' \times 6'' \times 8\frac{3}{5}''$; weight 8oz.)

So many British officers visit the battle-fields of the Franco-German War of 1870, that this excellent guide-book, by a military expert, will be welcome.

The author, in describing his visit made in July and August last year (the same months in which the battles were fought), says he publishes his notes in the hope of convincing his aspiring brother-officers of the high value of a thorough personal examination of the historic scenes of action of the great drama, the performance of which brought about the unity of Germany.

He insists upon the necessity of going over the ground on foot, and points out that, however excellent the map (he uses the indispensable battle maps of the German Staff History of the War), certain peculiarities of ground cannot be appreciated without personal inspection of it. He presupposes a thorough knowledge of the battles on the part of German officers (this, by the way, is not so common as is generally supposed), and a determination to see all the ground, even at the risk of wet feet or torn garments.

He recommends a companion to discuss the practical situations with. The author first takes us to Spicheren.

Starting from Mainz on the morning of the 26th July, for Bingerbrück, he travelled by rail to St. Johann, opposite Saarbrücken, and alighted at the Rheinische Hof Hotel.

There he hired a carriage and drove across the river to the parade ground (*exercirplatz*, 850 feet), and walked over the ground, map in hand. First

climbing the Reppertsberg to get a general view from the German side, he then drove along the high road to Metz till opposite the Folsterberg, and thence ascended on foot to the French positions.

He describes the different points, and gives some good criticism. Officers who have studied Colonel Henderson's well-known "Battle of Spicheren" will have the advantage in visiting this ground of comparing the views of the German and English experts.

Major Kunz considers the French should have had two tiers of shelter trenches for infantry fire on the Rotherberg, as, when the Germans arrived at its foot, they were protected by its steep front slopes (about 25°). He says three days would be required for a thorough examination of all the ground involved in this battle, and for the journey on to Metz, two hours distant by rail.

Next the author takes us to the battle-field of Gravelotte, fought on 18th August, 1870.

Starting from the Hôtel de l'Europe, which he praises, he entrained for Ars-sur-Moselle, and thence walked up through the Bois de Vaux by a foot-path 6½ feet wide, at a gradient of about $\frac{1}{10}$ for nearly a mile, to the plateau South of the Point du Jour.

He thinks this pathway might, in 1870, have been easily made practicable for artillery by the engineers available, so that the 7th German Corps Artillery might have been brought up that way, and have suddenly opened fire with overwhelming effect on the French positions here. He describes minutely the famous quarries, and enters into the question of their occupation and capture, and adds his criticism to that of Captain Hoenig and others in regard to the action, or rather inaction, of the Head Quarter German Staff on the 17th August, 1870. He gives himself a brief sketch of the measures he thinks should have been taken to obtain as great successes on the German right as on their left (St. Privat). He acknowledges, however, that it is easy to be wise after the event, and that twenty-five years' study of the facts and of the ground have much facilitated criticism. On the 28th July he took an early train to Amanvilliers, through the deep Châtel-St.-Germain gorge, which he enthusiastically describes. He climbed the hill-top, 1,058 S.W. and 1,081 S., and took a good general view of the French position. He visited Champenoise, Verneville, La Folie, and Montigny.

On the 29th July the author inspected the right portion of the French position from Amanvilliers to St. Privat.

The plateau between these points, he says, formed an ideal position for reserves, which could, unseen by the Germans, have readily moved in any required direction, and which could here have made the much wanted counter-stroke, as the ground was favourable. He describes the advanced post St. Marie 200 feet below and about 2,600 yards from St. Privat.

He shows how the French might have constructed shelter trenches near St. Privat, but does not mention the lack of entrenching tools on the part of the French 6th Corps, which we always thought was admitted.

Passing by the Marengo and Jerusalem Farms, the author returned to Amanvilliers; and from thence he returned to Metz on the 30th July, he studied the forts in Metz, and in the afternoon drove over the battle-field of Borny, fought 14th August, 1870.

On the 31st the author again took train to Châtel-St.-Germain. Thence he walked up the valley N.W. to the hill-top above the Leipzig Farm, one of the highest points of the French position (1,091 feet). He points out the great advantage the Bois de Genivaux gave the French, who had a covered approach to it for their local reserves at La Folie Farm.

He walked to the Moscow Farm, an important tactical pivot on the front edge of the position, which was connected with the Farm of St. Hubert, an advance post about half-a-mile off, and 75 feet lower down by shelter trenches. He considers it was but little tactical advantage to the Germans to take this, as it was

commanded and enfiladed from the French heights above, but the French in it had to be driven out, because they thence swept the Gravelotte Road. He considers the heights 1,102 and 1,097 the keys of this portion of the French position. These could, however, only be carried by a strong frontal attack from the Bois de Vaux, well combined with a flank attack from the quarries, both preceded by converging artillery cross-fire from the quarries and from Mogador. It is to be noted, however, that the latter is 3,360 yards off. He thinks that, properly planned and carried out, much less loss should have been incurred than in the heroic, isolated, unsuccessful attempts actually made in 1870. He goes into some details about this, but naïvely remarks that the exact method to be pursued is still a problem of much interest. Four hours for the artillery preparation and for reconnoitring the enemy's position were available.

He also attributes the great losses incurred to the old-fashioned method of fighting adhered to by brigade and higher leaders, as a result of the antiquated Prussian drill, which was not fully reformed till 1888, and sums up the great disadvantages under which the undeniably brave German soldiery laboured in their unsuccessful efforts to storm the French left, which was strongly entrenched. Having crossed over to Mogador Farm to view the German artillery positions there, he returned by Châtel-St.-Germain to Metz, having walked over eleven miles of ground.

He thus took four days to view the Gravelotte battle-field, having walked over thirty-five miles of ground, and taken careful notes everywhere. The author recommends using the train from Metz, as even the left of the French position is six-and-a-half miles from Point du Jour. He thinks the battle-fields of Colombey, Borny, and Noisseville-Servigny are best seen from a carriage, getting out to walk in certain parts.

On the 1st August the author inspected the battle-field of Vionville—Mars-la-Tour, taking train to Novéant-sur-Moselle and the omnibus to Gorze. Thence by carriage past St. Thiebault, through the Bois des Prêtres to Vionville. He considers the height 1,025 on the map the best for viewing the German artillery positions, but Vionville (900 feet high) or Flavigny (870 feet high) cannot be seen from it. He thence drove to Flavigny and Rezonvile. He says most of the losses sustained in the struggle of the 16th August, 1870 (Germans, 121 officers, 2,888 men; French, 120 officers, 2,165 men), were incurred in a space of about 1,600 yards by 500 yards.

The author walked over the classic ground famous for Von Bredow's headlong cavalry charge, and says the dust and the peculiarities of the ground may easily have hidden their approach from the French, whose attention at that time was chiefly directed towards Vionville.

The author worked over the ground of Mars-la-Tour, where Von Barby charged the French cavalry masses late in the evening near Ville-sur-Yron.

He describes the celebrated Bruville ravine, the scene of the disaster to the 38th Brigade, as 75 feet deep, and about 300 yards wide; it is, from the nature of the ground, imperceptible until you arrive quite close to it. He recommends officers to thoroughly study the description of the attack of this brigade by Captain F. Hoenig, in his "Tactics of the Future" (see the translation in No. 218 of the R.U.S.I. JOURNAL, April, 1896), as a good example of how essential it is to modify your dispositions when the enemy changes his.

The author recommends two days being spent on the field of Vionville—Mars-la-Tour, and gives detail how to best divide the time. He specially warns officers of the bare sustenance to be obtained at the little *auberges* and farms in this neighbourhood.

On the 3rd August he drove to the brewery near Noisseville, and commenced his inspection of the battle-fields of Noisseville-Servigny, Colombey-Nouilly, Peltre, and Sadonchamps. He considers that the battle-fields on the East side of Metz can be seen in three days by an active officer following the plan he details.

He gives a list of the hotels he recommends, and warns officers of the great distances, and of the lack of provisions in many places, so that they may take lunch with them. A good waterproof, leggings, and shooting boots seem also essential.

Throughout his narrative the author makes a sort of running commentary on the events of 1870, and indulges in many reflections on the feelings between French and Germans. On the whole, he has produced a most interesting and instructive guide-book, which officers intending to visit these famous battle-fields will do well to study and to carry with them. It would have been better for this purpose had it been printed in pocket size like the "Felddienst-Ordnung," and drill book.

It would also have been preferable to have given the account of each battle-field in the chronological order of the events of 1870, but perhaps the author thought it would detract from the personal and chatty character of his descriptions, to which his plaintive laments over the gastronomical deficiencies of the neighbourhood in certain parts add zest. He, perhaps, thinks also that as the book is only written for officers who have the events of the war at their fingers' end, the order in which the battle-fields are taken does not signify. But in this case, and indeed in any case, a short index would add to the value of this excellent guide.

Our Military Problem for Civilian Readers. By Captain F. I. MAXSE, Coldstream Guards. London: Dent & Co., 1896. Price, 1s.

In this book the author puts in plain language the present crying military needs of the Empire, and makes certain suggestions for absolutely necessary additions, and for various alterations which would tend to improve the Army as a fighting force. The provision of more field artillery and army service corps is without doubt necessary, and everybody has for years acknowledged the necessity for adding at least eleven battalions to the infantry of the line. More subalterns are also urgently required, particularly as the deficiency of officers of that rank in the Militia would make it impossible to obtain many from that Force.

The Manœuvres Bill is a remedy for his other suggestion, viz., the alteration of the laws of trespass, to permit of extended manœuvres on fresh ground; and it is a matter of great regret if the Government is compelled to abandon it this year. Captain Maxse's work is carefully written, but it is doubtful if he emphasises sufficiently the deficiency of regular troops in many of the Australian and African coaling stations, and the dangerous want of dock accommodation and telegraphic connection at many most important and strategical points. Certainly he mentions all these matters, but they cannot be too strongly insisted upon.

The final suggestion for an Imperial Defence Act would require every colony to be brought into line with the mother country in the matter of providing for the common safety, and is a task worthy of a great statesman.

Professional Papers of the Corps of Royal Engineers (Occasional Papers). Vol. XXI. 1895.

This volume exceeds all its predecessors in bulk, and most of them in interest. Its bulk is mainly due to a most valuable paper on railway construction, which occupies 110 pages, and is illustrated by seventy-four plates. It reproduces a course of seven lectures delivered at the S.M.E., Chatham, in 1894, by Sir G. Molesworth. It forms a manual of railway engineering, and it seems a pity that it was not bound up separately.

There is a good paper on recent progress in sewage purification, and an interesting discussion by Major Scott-Moncrieff, of various points in the design of soldiers' barracks. He takes the type of the new barracks at Aldershot, and contrasts with it a type proposed at the S.M.E. The latter has the advantage of

giving a good-sized dining-room to each half company, and he reckons that the extra cost is under 5 per cent.

Of the papers dealing with war-service, the most important is that by the editor, Major C. B. Mayne, on the organisation of the military and administrative services in a fortress during a siege. It is a subject which has not been hitherto treated by any English writer with anything like the same fulness. There is a useful little book by Captain Bornecque of the French Engineers, "Organisation des services accessoires dans une forteresse assiégée," to which Major Mayne acknowledges obligations, and which is itself based upon the work of Major-General von Kamptz. On some points allowance ought to be made for difference of national character ; for instance, the prescription that the commandant should give the clergy texts for their sermons is perhaps better suited to German than to English ideas. But Major Mayne's treatment of the subject is, to a great extent, fresh and independent ; he borrows illustrations from many sources, even from our latest defence in Chitral.

There is an excellent paper by Major Connor on fortification in savage warfare with examples from the wars in New Zealand, South Africa, the Soudan, Burmah, Tong-King and elsewhere, both of European and native methods ; and an interesting study by the late Captain du Costa Portea, of the battle of Woerth, and the use the Germans might have made of field-engineering there. Such use, he recognises, would have had little or no effect on the actual results, but might have had great effect if the battle had taken a different course, and Macmahon had assumed the offensive in the early morning. The details given by the German official account as to the movements of the pioneer companies furnish data to work upon. A great deal is to be learnt from problems of this kind, though the actua instance seems hardly the best for the purpose.

Among the remaining papers, that of Major Hughes, R.A., on field-artillery deserves mention. The *pros* and *cons* of high and low velocities, the value of quick-firers and of different kinds of ammunition, systems of draught and other conditions of mobility, are clearly and fairly set forth in it, with the help of the experience gained at Okehampton.

Patronized by every Government in Europe.

SYMONDS & Co.

Portrait & Marine Photographers,

39, HIGH STREET, PORTSMOUTH.

SPECIALITY—

PHOTOGRAPHS OF SHIPS OF THE BRITISH & FOREIGN NAVIES,

TORPEDO-BOATS AND TORPEDO-BOAT DESTROYERS,

at anchor and at full speed, and instantaneous Yacht Racing subjects, the most important Collection in England, size 11 × 9, price 2/6 each, unmounted.

Photographs of all Ships of the Flying Squadron, Channel and Mediterranean Fleets, also Ships on the Australian, African, Pacific, China, and other Stations, unmounted.

Marine Lantern Slides of Ancient and Modern Ships of War, Torpedo-Boats and Destroyers, Life Incidents and Drill on Board Training and Battle-Ships. Sub-Marine Mining Explosions, Ships in Storms, and Battle Scenes, suitable for Lectures, Entertainments, &c., price 1/6 each; and for finale, fine slide of "God Save the Queen," with Portrait of Her Majesty, price 2/6.

CATALOGUES POST FREE.

NORTHERN ASSURANCE COMPANY.

INCOME AND FUNDS, 1893.

Fire Premiums, £716,000.

Life Premiums, £224,000.

Interest, £169,000.

Accumulated Funds, £4 293,000.

NORTHERN ASSURANCE COMPANY.

Branches—

Birmingham.
Bristol.
Dublin.
Dundee.
Edinburgh.
Glasgow.
Liverpool.
Manchester.
Newcastle.
Nottingham.
Boston, U.S.
Chicago.
New York.
San Francisco.
Montreal.
Melbourne.

Head Offices { **ABERDEEN: 1, Union Terrace.**
LONDON: 1, Moorgate Street, E.C.

THE EQUIPMENT OF OUR ARMY AND NAVY

IS INCOMPLETE WITHOUT THE

The finest Mechanical Writer of the age.

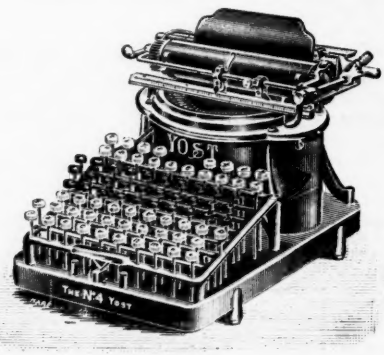
No. 4 Yost Typewriter

The Acme of Perfection.

*

It is specially adapted for use on **BOARD SHIP** and **IN THE FIELD.**

*



*

Naval and Military Reports can be written with rapidity and legibility.

Catalogues Post Free.

*

- For Foreign or Home Service it is -

THE BEST TYPEWRITER EXTANT.

It is built entirely of the Best Metals, and, having a Pad instead of an Ink Ribbon, it is not adversely affected by variations in temperature.

YOST Machines fitted with Hindustani Characters are now being manufactured.

The YOST Typewriter Co. Ltd.,

50, Holborn Viaduct, LONDON, E.C.

West End Depot: 21, HIGH STREET, KENSINGTON.

MANCHESTER: 3, Deansgate.
LIVERPOOL: 22a, North John Street.
BELFAST: 13, Rosemary Street.
NEWCASTLE-ON-TYNE: 50, Dean St.
BIRMINGHAM: 73, Temple Row.
LEEDS: 21, New Station Street.
GLASGOW: 112, St. Vincent Street.
CARDIFF: 77, St. Mary's Street.
PARIS: 36, Boulevard des Italiens.

THE ADVERTISEMENT DEPARTMENT OF THIS JOURNAL IS CONDUCTED IN S. H. BENSON'S ADVERTISING OFFICES 129, FLEET STREET, E C., WHERE ALL COMMUNICATIONS SHOULD BE ADDRESSED.